Minerals yearbook: Mineral fuels 1965. Year 1965, Volume II 1967

Bureau of Mines
Washington, D. C.: Bureau of Mines : United States Government Printing Office, 1967

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Minerals Yearbook
1965

Volume II of Four Volumes

MINERAL FUELS

Prepared by staff of the
BUREAU OF MINES

Foreword

This issue marks the 100th year since the first publication by the Federal Government of a report on the U.S. mineral industries and the 84th year in which the Minerals Yearbook or its predecessors have been issued on an annual basis. The general content of the four-volume edition follows:

Volume I, Metals and Minerals (Except Fuels), contains chapters on metal and nonmetal mineral commodities except mineral fuels. In addition, it includes a chapter reviewing these mineral industries, a statistical summary, and chapters on mining and metallurgical technology, employment and injuries, and technologic trends.

Volume II, Mineral Fuels, contains a chapter on each mineral fuel and on such related products as helium, carbon black, peat, coke and coal chemicals, and natural gas liquids. Also included are data on employment and injuries in the fuel industries and a mineral-fuels review summarizing recent economic and technologic developments.

Volume III, Area Reports: Domestic, contains chapters covering each of the 50 States, the U.S. island possessions in the Pacific Ocean, the Commonwealth of Puerto Rico, the U.S. island possessions in the Caribbean Sea, and the Canal Zone. Volume III also has a statistical summary chapter, identical with that in Volume I, and a chapter on employment and injuries.

Volume IV, Area Reports: International, contains 105 chapters presenting the latest available mineral statistics for more than 130 foreign countries and areas. A separate chapter reviews minerals in the world economy.

The 1965 Minerals Yearbook has been redesigned to achieve a more compact volume and to maximize economy and efficiency in its publication. We believe that the short lines of the text improve readability despite use of the smaller type.

The Bureau of Mines' continuous effort to enhance the Yearbook's value to its wide readership can be aided by constructive comments and suggestions of its users. Such comment is particularly invited during the formative years of the new International review volume.

WALTER R. HIBBARD, JR., *Director*

Acknowledgments

The chapters in this volume of the MINERALS YEARBOOK were prepared by the staffs of the Division of Anthracite, Division of Bituminous Coal, Division of Petroleum, Division of Statistics, Division of Economic Analysis, Division of Accident Prevention and Health, and Assistant Director—Helium.

Charles E. Hennig directed preparation of the "Petroleum and Related Products" chapters and T. W. Hunter directed preparation of the "Coal and Related Products" chapters. Preparation of this volume was coordinated by James G. Kirby and Thelma K. Stewart.

World production tables were compiled under the direction of Berenice B. Mitchell, Division of International Activities, from many sources including data from the Foreign Service, U.S. Department of State.

Because of the many sources of data presented, the Bureau cannot credit each individually, but acknowledgment is made to the splendid cooperation of producers and users of fuels and of the business press, trade associations, scientific journals, international organizations, and Federal agencies that supplied information.

State agencies that supplied information used in this volume are listed in the acknowledgments section of Volume III.

WILLIAM C. ELLIOTT, Jr.
Chief, Division of Petroleum

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UNITED STATES DEPARTMENT OF THE INTERIOR • Stewart L. Udall, Secretary

BUREAU OF MINES • Walter R. Hibbard, Jr., Director

Created in 1849, the Department of the Interior—a Department of Conservation—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1967

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $2.50

Review of the Mineral-Fuel Industries

By Warren E. Morrison[1] and Charles L. Readling[2]

Contents

Demand for energy in the United States in 1965 was stimulated by the continuing expansion of the economy. A gain of 5.9 percent in gross national product for the year was accompanied by a 4.4-percent rise in energy consumption. Domestic energy resources met about 93 percent of the nation's requirements. The remaining 7 percent consisted of imported fuels, mainly of crude petroleum and residual fuel oil. The major fossil fuels—natural gas, crude petroleum, and coal, in that order—contributed 96 percent of all commerical energy utilized, with the balance of 4 percent being primary electricity from hydropower and nuclear power plants.

Production was up for all of the major mineral energy resources in 1965, with the single exception of anthracite, output of which continued to decline. Bituminous coal output for the year was 512 million tons; marketed production of natural gas, 16,039 billion cubic feet; and crude petroleum output, 2,848 million barrels. Among the secondary products processed from primary energy resources, the most significant gains were in coal carbonized for coke which increased 6.7 percent to 95 million tons, and in the output of liquefied gases from natural gas which rose 4.8 percent to 11,257 million gallons (268 million barrels). Within the latter category, the offtake for petrochemical feedstocks continued to rise at a very rapid pace.

Energy use within all four major energy sectors or markets increased significantly during 1965. In the household and commercial sector, use of utility electricity continued to encroach on direct consumption of fossil fuels, with increasing competition among these sources in the areas of space heating and air-conditioning. Among the fossil fuels, consumption of both oil and gas in the household and commercial markets increased during the year while coal decreased. In the industrial sector, consumption of both utility electricity and fossil fuels increased. Here, also, utility power is growing faster than direct fuels, although the latter is by far the greater part of the total in this sector. Contributing to growth in the industrial market is the increasing raw material use of energy resources, particularly natural gas liquids for petrochemical feedstocks. The transportation sector remained largely the province of direct fuels during 1965—principally petroleum products with relatively little utility electricity distributed to this sector. The principal source of energy growth in this market was the rapidly expanding use of gasoline in automotive transportation.

The fastest growing energy market in 1965 was the electric utility sector where total generation was up 7 percent from the previous year. Coal accounted for 52 percent of energy resource inputs here. For the first time, however, the annual consumption of natural gas at electric utilities declined. The curtailment of gas use at powerplants is due to increased storage facili-

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[2] Statistical assistant, Division of Economic Analysis.

ties for gas near urban centers and the growing tendency to use higher value natural gas for other purposes during the off-season summer months. Conventional utility plants using fossil fuels accounted for 81 percent of 1,055 billion kilowatt-hours of utility power generated in 1965. The other 19 percent came from primary generation of hydropower plants, while less than 1 percent of the total was contributed by nuclear powerplants. Generation at nonutility plants during the year totaled 102 billion kilowatt-hours. About 53 percent of all utility power generated was distributed to the household and commercial sector. Most of the remainder, about 46 percent, went to the industrial sector. Less than 1 percent of utility electricity goes to the transportation sector.

Accompanying the expanding output and consumption of energy in 1965 were significant gains in the dollar value of primary and secondary energy resources. Despite inflationary tendencies in some parts of the economy, the prices and costs of the energy resources industries remained relatively stable during the year, although national income generated by these industries increased sharply. There were no significant shifts in employment and wages in the major energy industries during the year. However, many of these industries continued to produce at near capacity levels to meet the expanding energy requirements of the economy. This has stimulated expenditures for new plants and equipment by some industries. There were no significant shifts in the United States foreign trade in energy resources during the year, either in exports or imports.

Several additions have been made to the statistical series in this chapter. In table 13, utility electricity generated is now distributed as electricity purchased to the household and commercial, industrial, and transportation sectors. This distribution is estimated from the energy sales by classes of service shown in the Edison Electric Institute Statistical Yearbook of the Electric Utility Industry. In table 7 generation of utility electricity is now broken down into conventional generation, and nuclear and hydropower generation. Generation of electricity by industrial plants other than utility plants is also shown.

PRODUCTION

Production by Source.—Output of primary mineral energy resources and primary electricity from hydropower and nuclear power sources in 1965, shown in table 1, was equivalent to 49,460 trillion British thermal units (Btu). This was 3.4 percent above the level in 1964. Figures 1 and 2 show trends of production of energy resources from 1900 to 1965. Most of the nation's energy in 1965, about 96 percent, came from fossil fuels. Natural gas ranked first as an energy source accounting for over one-third of total energy. Crude petroleum followed closely with slightly less than one-third, and coal was next with about one-quarter of the total. Hydropower and nuclear power registered appreciable increases during the year, although the combined contribution of these to total energy remained at about 4 percent.

Production of mineral energy resources in conventional units is shown in table 2. Continuing in its rising trend, bituminous coal production rose 5.2 percent during the year. Marketed production of natural gas was up 3.7 percent, and production of crude petroleum increased 2.2 percent. It is interesting to note that while physical production of crude petroleum increased 2.2 percent in 1965 (table 2), the energy equivalent of this output rose only 1.3 percent (table 1). This apparent inconsistency is due to the declining average Btu content of crude petroleum caused by the higher proportion of lighter (higher API gravity) crude oils in domestic production. For 1964, the average Btu value per barrel of crude oil produced is calculated at 5,630,000 Btu and for 1965, 5,580,000 Btu. The expansion of 1965 output of natural gas liquids was somewhat below the increase for 1963–64, owing to the somewhat slower growth of the natural gasoline and cycle products components. This, however, was partially offset by the continuing rapid expansion of the liquefied petroleum gas component, a growing portion of which is used for petrochemical feedstocks.

Production trends for total minerals, mineral energy resources, and metals and nonmetals are compared in table 3. Trends

Table 1.—Production of mineral energy resources and electricity from hydropower and nuclear power, in British thermal units (Btu), and percentage contributed by each in the United States [1]

Year	Anthracite	Bituminous coal and lignite	Natural gas, wet (unprocessed)	Crude petroleum	Electricity: Hydropower	Electricity: Nuclear power	Total
			Trillion Btu [1]				
1961	443	10,558	14,691	15,185	1,605	17	42,499
1962	429	11,060	15,365	15,495	1,774	23	44,146
1963	464	12,024	16,271	15,741	1,741	33	46,274
1964	436	12,759	17,056	15,690	1,861	34	47,836
1965 p	378	13,417	17,698	15,900	2,029	38	49,460
			Percentage				
1961	1.0	24.8	34.7	35.8	3.7	--	100.0
1962	1.0	25.0	34.8	35.1	4.0	.1	100.0
1963	1.0	26.0	35.1	34.0	3.8	.1	100.0
1964	.9	26.7	35.6	32.8	3.9	.1	100.0
1965 p	.8	27.1	35.8	32.1	4.1	.1	100.0

p Preliminary.
[1] Hydropower and nuclear power include installations owned by manufacturing plants and mines, as well as Government and privately owned public utilities. The fuel equivalent of hydropower and nuclear power is calculated from the kilowatt-hours of power produced, converted to coal input equivalent at the prevailing average pounds of coal per kilowatt-hour each year at central electric plants, using 12,000 Btu per pound.

of total industrial production and mining are also shown in table 4. Among the indexes of physical production (table 3), the highest gains during the year were in nonmetals and metals, while energy resources grew at a lesser rate. Compared to the change in the index of total industrial productions (table 4), gains in total mining and production of mineral energy resources were of lesser magnitude in 1965. This shows the tendency of mining to grow at a slower rate than total industrial production during periods of economic expansion. The continuing high level of growth in the index for gas and gas liquids reflects the current rapid expansion of liquefied gases, which are the major inputs for petrochemicals.

Value of Production.—The total value of mineral energy resources in 1965, shown in table 5, was almost double the combined value of metals and nonmetals. The dollar value of natural gas output during the year (table 2) remained less than one-third of the value of the crude petroleum produced, although the energy equivalent of the natural gas continued to exceed that of petroleum (table 1). Crude petroleum represented 58 percent of the total value of the mineral energy resources produced during the year, while natural gas value was 18 percent and coal value 17 percent of the total. Natural gas liquids and helium, shown in table 2, are byproducts of the primary production of natural gas. To determine the value of primary mineral energy resources produced, the values of these byproducts should be excluded from the total.

CONSUMPTION

Consumption by Source.—The heat value of energy resources consumed either as fuel and power or as raw materials during 1965 was equivalent to 53,791 trillion Btu. This was 4.4 percent greater than that of 1964. Demand for fossil fuel and primary electricity by source is shown in Btu equivalent in table 6 and in conventional units in table 7. Among the fossil fuels the principal increase was in bituminous coal uses, wherein the annual gain was 6.5 percent. Compared to the surge of 14 percent in

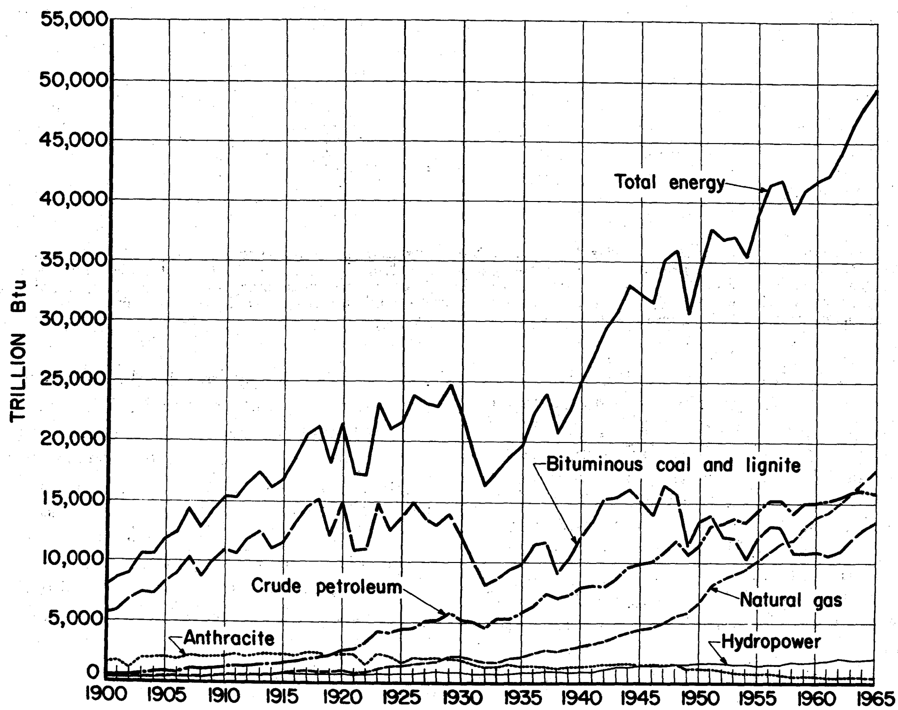

Figure 1.—Production of mineral energy resources and energy from hydropower in Continental United States 1900–1965.

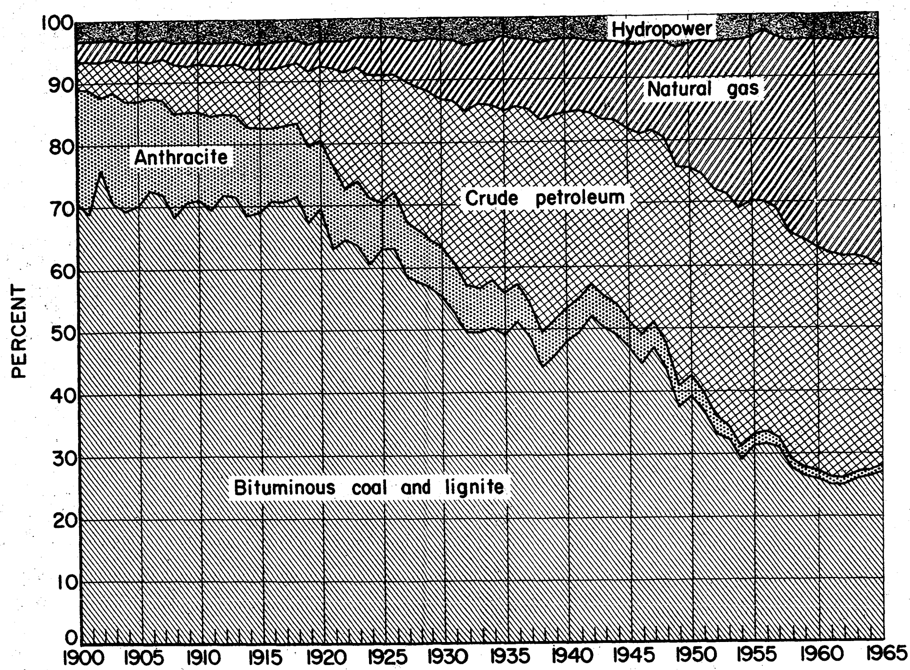

Figure 2.—Percentage of total production of British thermal units equivalent of mineral energy resources and energy from hydropower in Continental United States 1900–1965.

Table 2.—Mineral energy resources production in the United States

Mineral	1962 Quantity	1962 Value (thousands)	1963 Quantity	1963 Value (thousands)
Asphalt and related bitumens, native:				
Bituminous limestone and sandstone short tons	1,647,063	$14,601	1,632,645	$8,383
Gilsonite do	--	---	---	---
Carbon dioxide, natural, estimated thousand cubic feet	1,144,107	146	1,295,545	178
Coal:				
Bituminous and lignite [1] thousand short tons	422,149	1,891,553	458,928	2,013,309
Pennsylvania anthracite do	16,894	134,094	18,267	153,503
Helium:				
Refined thousand cubic feet	599,519	20,905	627,344	21,957
Crude do	NA	NA	NA	NA
Natural gas, wet million cubic feet	13,876,622	2,145,301	14,746,663	2,328,030
Natural gas liquids:				
Natural gasoline and cycle products thousand gallons	6,244,522	444,817	6,534,967	439,173
Liquefied petroleum (LP) gases [2] do	9,409,083	353,334	10,302,250	359,770
Peat short tons	566,441	5,186	546,621	5,423
Petroleum, crude thousand 42-gallon barrels	2,676,189	7,774,051	2,752,723	7,965,743
Total mineral energy resources	---	12,784,000	---	13,295,000
Total all other minerals	---	6,054,000	---	6,320,000
Grand total, mineral production	---	18,838,000	---	19,615,000

Mineral	1964 Quantity	1964 Value (thousands)	p 1965 Quantity	p 1965 Value (thousands)
Asphalt and related bitumens, native:				
Bituminous limestone and sandstone short tons	1,935,344	10,038	1,911,664	9,461
Gilsonite do	---	---	---	---
Carbon dioxide, natural, estimated thousand cubic feet	1,236,816	166	1,173,676	152
Coal:				
Bituminous and lignite [1] thousand short tons	486,998	2,165,582	512,088	2,276,022
Pennsylvania anthracite do	17,184	148,648	14,866	122,021
Helium:				
Refined thousand cubic feet	830,481	25,923	798,334	26,839
Crude do	3,197,016	35,322	3,566,734	39,848
Natural gas, wet million cubic feet	r 15,462,138	2,387,689	16,039,753	2,494,542
Natural gas liquids:				
Natural gasoline and cycle products thousand gallons	7,000,181	463,600	7,288,070	494,354
LP gases [2] do	10,743,591	362,792	11,257,267	417,249
Peat short tons	r 639,690	r 6,198	603,746	6,080
Petroleum, crude thousand 42-gallon barrels	2,786,822	8,017,078	2,848,462	8,158,150
Total mineral energy resources	---	13,623,000	---	14,045,000
Total all other minerals	---	6,884,000	---	7,388,000
Grand total, mineral production	---	20,507,000	---	21,433,000

NA Not available. p Preliminary. r Revised.

[1] Includes small quantity of anthracite mined in States other than Pennsylvania.

[2] Excludes liquefied refinery gas (LRG).

coke consumption during 1963–64, demand for coke expanded at a relatively slower rate, 4.5 percent in 1965. The 3.7-percent annual gain in consumption of natural gas was also below growth rates for recent years. While crude petroleum runs to stills exhibited only a small increase over the previous year's level, the demand for all oils including natural gas liquids was up 4.2 percent. The comparatively higher rate of expansion in processed oil products compared with crude petroleum reflects the exceptionally high growth rate for natural gas liquids in the recent period, par-

Table 3.—Indexes of physical volume of mineral production in the United States, by group and subgroups[1]

1957–59=100

Year	All minerals	Energy resources: Total	Energy resources: Coal	Energy resources: Crude oil and natural gas[2]	Metals	Non-metals
1956	103.4	103.5	115.5	100.8	116.3	97.5
1957	103.3	103.5	112.5	101.6	120.0	95.4
1958	96.0	96.0	93.7	96.4	92.8	97.5
1959	100.7	100.5	93.8	102.0	87.2	107.1
1960	103.3	101.6	93.9	103.0	110.8	105.8
1961	104.5	103.1	90.8	105.2	106.4	108.3
1962	107.4	106.0	94.6	107.8	105.0	113.3
1963	112.2	110.8	102.8	111.6	105.7	119.4
1964	116.7	114.0	108.2	113.8	113.9	126.9
1965	120.8	117.3	112.6	116.6	117.5	134.2

[1] Reweighted using 1957–59 weights. For description of index see Bureau of Mines Minerals Yearbook, 1956, v. 1, pp. 2–5.

[2] Does not cover isopentane, LP gases and other natural gas liquids.

Table 4.—Indexes of industrial production, mineral energy resources, seasonally adjusted

1957–59=100

Year	Total industrial production	Total mining	Coal, oil, and gas	Coal	Crude oil and natural gas: Total[1]	Crude oil and natural gas: Crude oil	Crude oil and natural gas: Gas and gas liquids
1961	109.8	102.6	100.9	90.1	103.1	103.0	116.8
1962	118.3	105.0	103.8	95.3	105.5	105.1	120.4
1963	124.3	107.9	107.0	102.5	107.9	108.1	128.7
1964	132.3	111.3	109.8	107.1	110.4	109.9	136.1
1965 p	143.3	111.4	112.2	111.8	112.3	111.8	142.8
January	138.6	111.8	109.4	107.7	109.8	109.8	134.6
February	139.2	111.8	109.4	103.2	110.6	108.6	141.0
March	140.7	112.5	110.0	103.1	111.4	110.5	140.2
April	140.9	113.0	111.3	107.9	112.0	111.4	144.0
May	141.6	114.0	112.1	113.0	111.9	111.3	143.1
June	142.7	115.3	113.3	117.1	112.5	112.2	146.5
July	144.2	116.0	113.7	117.1	113.0	112.1	147.9
August	144.5	117.0	114.4	115.2	114.2	113.4	144.6
September	143.5	112.6	109.9	106.7	110.6	108.5	144.8
October	145.1	115.8	114.5	116.8	114.0	114.0	144.5
November	146.4	116.0	114.1	115.7	113.8	114.5	142.6
December	148.7	117.9	115.2	118.5	114.5	116.0	143.9

p Preliminary.

[1] Total includes oil and gas drilling.

Source: Board of Governors of the Federal Reserve System. Federal Reserve Bulletin, monthly issues February–June 1966. A description and historical data are available in Business Indexes, Industrial Production, 1957–59 Base, published by Federal Reserve, monthly.

ticularly liquefied gases which are the major source of petrochemical feedstocks.

In 1965, 1,055 billion kilowatt-hours of electricity were generated at utility plants. About 81 percent of the total was generated at conventional fuel-burning plants while hydropower accounted for most of the remainder. An additional 102 billion kilowatt-hours were self-generated at nonutility industrial plants. Electricity output at nuclear plants remained less than 1 percent of total generation. However, an increase of 9 percent in generation from this source for the year may be taken as an

Table 5.—Value of mineral production in the United States, by mineral group [1]

(Million dollars)

Mineral group [2]	1961	1962	1963	1964 r	1965 p	Change in 1965 from 1964 (percent)
Metals and nonmetals except fuels:						
Nonmetals	3,946	4,117	4,318	4,623	4,916	+6.3
Metals	1,927	1,937	2,002	2,261	2,472	+9.3
Total	5,873	6,054	6,320	6,884	7,388	+7.3
Mineral energy resources	12,357	12,784	13,295	13,623	14,045	+3.1
Grand total	18,230	18,838	19,615	20,507	21,433	+4.5

r Revised. p Preliminary.

[1] Includes Alaska and Hawaii.

[2] For details, see table in the chapter "Statistical Summary," v. 1 of the 1965 Minerals Yearbook. Value of mineral production including mineral energy resources is shown in 1957–59 constant dollars in "Review of the Mineral Industries," table 2, v. 1, 1965 Minerals Yearbook.

Table 6.—Calculated gross consumption of mineral energy resources, and electricity from hydropower and nuclear power in British thermal units (Btu), and percent contributed by each in the United States [1]

Year	Anthracite	Bitmuinous coal and lignite	Natural gas, dry	Petroleum (excluding natural gas liquids)	Natural gas liquids	Electricity: Hydropower	Electricity: Nuclear power	Total
	Trillion Btu							
1961	404	9,809	13,228	18,989	1,498	1,628	17	45,573
1962	363	10,160	14,027	19,662	1,605	1,780	23	47,620
1963	361	10,722	14,843	20,282	1,668	1,740	33	49,649
1964	365	11,295	15,562	20,617	1,769	1,873	34	51,515
1965 p	328	12,030	16,136	21,337	1,872	2,050	38	53,791
1961	.9	21.5	29.0	41.6	3.3	3.6	.1	100.0
1962	.8	21.3	29.4	41.3	3.4	3.7	.1	100.0
1963	.7	21.6	29.9	40.8	3.4	3.5	.1	100.0
1964	.7	21.9	30.2	40.0	3.5	3.6	.1	100.0
1965 p	.6	22.4	30.0	39.6	3.5	3.8	.1	100.0

p Preliminary.

[1] Heat values employed are anthracite, 12,700 Btu per pound; bituminous coal and lignite, 13,100 Btu per pound; crude oil 1961: 5,791,380 Btu per barrel, 1962: 5,674,510 Btu, 1963: 5,718,300 Btu, 1964: 5,630,254 Btu, and 1965: 5,582,026 Btu; weighted average British thermal units for petroleum products obtained by using 5,248,000 gasoline, 5,670,000 kerosine, 5,825,000 distillate, 6,287,000 residual, 6,064,800 lubricants, 5,537,280 wax, 6,636,000 asphalt, and 5,796,000 miscellaneous; natural gas dry, 1,035 Btu per cubic foot; natural gas liquids weighted average British thermal units based on production of natural gasoline at 110,000 Btu per gallon, and LP gas at 95,500 Btu per gallon. Hydropower and nuclear power converted to coal equivalent at the prevailing rate of pounds of coal per kilowatt-hour each year at central electric stations, using 12,000 Btu per pound.

indication of the future potential importance of nuclear power in the utility sector.

Consumption by Consuming Sector.—Supply and demand balances for the major fossil fuels by consuming sector are shown in conventional units and energy equivalent in tables 8–13. Integrated energy balances by source and end-use sector prepared from these tables are shown in table 13.

In the household and commercial sector, energy resources consumed increased 5.6 percent during 1965. Inputs of utility electricity continued to grow at a rapid rate, 8 percent above that of 1964, and this sector absorbed 54 percent of the generation at electric utilities during the year (table 13).

Table 7.—Apparent consumption of energy resources and selected related products

Commodity	1964	p 1965	Percent change from 1964
Primary energy resources:			
Bituminous coal ------------------million net tons--	431.1	459.2	+6.5
Crude petroleum, runs to stills ---- million barrels--	r 3,223.3	3,300.8	+2.4
Natural gas [1] ------------------ million cubic feet--	15,036,120.0	15,590,452.0	+3.7
Anthracite ---------------------- million net tons--	14.4	12.9	—10.4
Hydropower, utility [2] ------- million kilowatt-hours--	179,027.0	193,988.0	+8.3
Nuclear power, utility [3] -------------------- do----	3,340.8	3,643.7	+9.1
Products:			
All oils, domestic product demand [4] --million barrels--	4,034.2	4,202.4	+4.2
Coke -------------------------- million net tons--	62.6	65.4	+4.5
Electricity, conventional fuel-burning plants:			
Utility -------------- million kilowatt-hours [2]--	803,576.2	857,698.3	+6.7
Industrial -------------------------- do [4]----	99,751.0	102,139.0	+2.4

p Preliminary. r Revised.
[1] Residue gas, excludes extraction loss but includes transmission loss.
[2] Net generation, plus 1,954 million kilowatt-hours of net imports of electricity in 1964 and estimated net imports 540 million kilowatt-hours in 1965. The bulk of net imports is hydropower with an undetermined portion of steam plant power.
[3] Net generation.
[4] Includes natural gas liquids.

Table 8.—Supply and demand for anthracite, domestic

	1964		p 1965	
	Thousand net tons	Trillion Btu	Thousand net tons	Trillion Btu
Supply:				
Production [1] --------------------------------	17,184.3	436.5	14,866.0	377.6
Imports --------------------------------	---	---	---	---
Exports --------------------------------	—1,575.1	—40.0	—850.6	—21.6
Stock change --------------------------------	---	---	---	---
Losses, gains, and unaccounted for ---------	—1,209.2	—30.7	—1,115.4	—28.3
Total --------------------------------	14,400.0	365.8	12,900.0	327.7
Demand by major consuming sectors: [2]				
Household and commercial [3] -----------------	3,334.0	84.7	3,126.0	79.4
Industrial [4] --------------------------------	1,803.0	45.8	1,915.0	48.7
Transportation [5] -----------------------------	6	6	6	6
Electricity generation, utilities --------------	2,239.0	56.9	2,158.0	54.8
Miscellaneous and unaccounted for -----------	7,024.0	178.4	5,701.0	144.8
Total --------------------------------	14,400.0	365.8	12,900.0	327.7

p Preliminary.
[1] Includes use by producers for power and heat.
[2] With the exception of small quantities used as raw material for coal chemicals, all anthracite is used for fuel and power.
[3] Data represent "retail dealer deliveries to other consumers." These are mainly household and commercial users, with some unknown portion of use by small industries.
[4] Includes consumption by coke plants, steel and rolling mills, and other industrial users.
[5] Includes bunkers and military transportation.
[6] Data not available. Believed to be small and of minor significance.

Utility power, however, still represented only 14 percent of household and commerical energy resource inputs, while fossil fuels consumed directly were 86 percent. While the latter did increase 5.2 percent during the year, this was at a slower rate than utility power. Direct inputs of petroleum and natural gas, mainly for space heating, were both up (tables 10 and 11), while sector use of bituminous coal, lignite, and anthracite continued to decline. The declining trend of direct coal use is more than offset by the growth of utility electricity, for which coal is the principal fuel source (tables 8 and 9).

Although the industrial sector remains

Table 9.—Supply and demand for bituminous coal and lignite, domestic

	1964		p 1965	
	Thousand net tons	Trillion Btu	Thousand net tons	Trillion Btu
Supply:				
Production 1	486,998.0	12,759.3	512,088.3	13,416.7
Imports	293.1	7.7	184.4	4.8
Exports	—47,969.4	—1,256.8	—50,181.4	—1,314.8
Stock change	r —4,910.9	r —128.7	—1,800.0	—47.2
Losses, gains, and unaccounted for	r —3,294.8	r —86.5	—1,127.3	—29.5
Total	431,116.0	11,295.0	459,164.0	12,030.0
Demand by major consuming sectors:				
Fuel and power:				
Household and commercial 2	19,615.0	560.0	19,048.0	546.0
Industrial 3	182,877.7	5,222.6	191,540.0	5,490.9
(Coal carbonized for coke)	(88,757.6)	(2,325.4)	(94,778.7)	(2,483.2)
Transportation 4	711.0	20.0	655.0	18.8
Electricity generation, utilities	223,032.0	5,353.0	242,729.0	5,825.5
Total	426,235.7	11,155.6	453,972.0	11,881.2
Raw material: 5				
Industrial:				
Crude light oil	1,243.3	35.5	1,303.5	37.3
Crude coal tar	3,637.0	103.9	3,888.5	111.5
Total	4,880.3	139.4	5,192.0	148.8
Total	431,116.0	11,295.0	459,164.0	12,030.0

p Preliminary. r Revised.

1 Includes use by producers for power and heat.

2 Data represent "retail deliveries to other consumers." These are mainly household and commercial users, with some unknown portion of use by small industtries.

3 Includes consumption by coke plants, steel and rolling mills, and other industrial users.

4 Includes bunkers and military transportation.

5 Coal equivalent based on British thermal unit value of raw materials used for coal chemicals.

the largest energy market, its growth, 3.3 percent in 1965, is below that of the household and commercial sector. Direct fuel consumption in the industrial sector accounted for 91.5 percent of resource inputs during the year, and utility electricity for 8.5 percent. Here also electricity use is seen to be increasing at a faster rate than direct fuels (table 13). Sector consumption of both petroleum and natural gas increased during the year. In the case of gas, growth continued to be principally in process heating, whereas petroleum gains were largely in the liquefied gases and oil products used for petrochemical feedstocks (tables 10, 11, and 12). Some 185.3 million barrels of LPG and oil products were committed to this use, representing an increase of 5.3 percent over the level reported for 1964 (table 11). Industrial consumption of coal increased 4.8 percent, with most of the expansion consisting of coking coal for the coke industry. There were also slight increases in the general industrial use of coal including self-generation of electricity during the year (table 9).

In transportation, sector demand increased 3.5 percent in 1965; the bulk of the demand was for petroleum products. Relatively little utility power is consumed in this sector (tables 12 and 13). Over half of the total consumption of petroleum products in all uses, some 4,202 million barrels, were consumed in the transportation sector. The largest single petroleum product was gasoline, demand for which increased 3.8 percent with 1,720 million barrels consumed.

The electric utility market continued to have the fastest growth among the four energy markets in 1965. Energy resource inputs to this sector increased 7.3 percent over that of 1964 (table 13). Fossil fuels consumed by conventional fuel-burning plants accounted for 81 percent of the total inputs. The remaining 19 percent consist of theoretical inputs (based on coal equivalents) for hydropower and nuclear power plants. The bulk of this input is for hydropower with nuclear power contributing less

Table 10.—Supply and demand for natural gas, domestic

	1964		p 1965	
	Million cubic feet	Trillion Btu	Million cubic feet	Trillion Btu
Supply:				
Production [1]	15,462,143.0	17,055.6	16,039,753.0	17,697.7
Imports	440,918.0	456.3	456,394.0	472.4
Exports	—19,497.0	—20.2	—34,107.0	—35.3
Stock change	—128,804.0	—133.3	—118,115.0	—122.2
Transfers out, extraction loss [2]	—718,640.0	—1,796.0	—753,473.0	—1,876.5
Losses, gains, and unaccounted for	—	—	—	—
Total	15,036,120.0	15,562.4	15,590,452.0	16,136.1
Demand by major consuming sectors:				
Fuel and power:				
Household and commercial	5,133,968.0	5,313.7	5,346,450.0	5,533.6
Industrial	6,860,880.0	7,101.0	7,141,929.0	7,391.9
Transportation	433,204.0	448.4	500,524.0	518.0
Electricity generation, utilities	2,321,889.0	2,403.1	2,318,253.0	2,399.4
Total	14,749,941.0	15,266.2	15,307,156.0	15,842.9
Raw material: [3]				
Industrial:				
Carbon black	106,179.0	109.9	93,296.0	96.6
Other chemicals [4]	e180,000.0	e186.3	e190,000.0	e196.6
Total	286,179.0	296.2	283,296.0	293.2
Total	15,036,120.0	15,562.4	15,590,452.0	16,136.1

e Estimate. p Preliminary.
[1] Marketed production includes wet gas sold or consumed by producers, losses in transmission, producers additions to storage, and increases in gas pipeline fill; excludes repressuring and vented and wasted. British thermal unit value of production is for wet gas prior to extraction of natural gas liquids. Higher values assigned to extraction loss are reflected in value of production for each year.
[2] Extraction loss from cycling plants represents offtake of natural gas for natural gas liquids as reported to Bureau of Mines. Energy equivalent of extraction loss is based on annual outputs of natural gasoline and associated products at 110,000 Btu per gallon and annual outputs of liquefied petroleum gases at 95,500 Btu per gallon.
[3] Includes some fuel and power use by raw materials industries.
[4] Estimated from partial data.

than 1 percent of total utility generation. Of the fossil fuels utilized at conventional plants, bituminous coal accounted for 52 percent of the total. Total consumption of bituminous coal in the utility sector was 243 million tons, 9.0 percent above that of 1964. In addition about 2 million tons of anthracite were consumed at utility plants (tables 8 and 9).

About 22 percent of resource inputs at utilities in 1965 was natural gas, and 7 percent petroleum, mainly residual fuel oil. In the case of gas, the 2,318 billion cubic feet utilized represented a slight decline from the 1964 level. This decline is due to the decreasing availability of surplus gas for powerplant use during the summer months, made possible by increasing gas storage near urban centers, and the rising demand for higher value gas in other uses (table 10).

Total generation of electricity at utility plants in 1965 was 1,055 billion kilowatt-hours, 7 percent above that of 1964 (table 7). Relating this generation to the energy equivalent of the resource inputs for fossil fuels and for hydropower and nuclear power plants, the calculated heat rate (Btu per kilowatt-hour) for 1965 was 10,531 Btu. The resulting ratio of 3.09 to 1 between resource inputs and net generation represents the losses incurred in processing direct fuels to electricity (table 13). Electricity generated at industrial plants other than utilities during the year was 102 billion kilowatt-hours (table 7). The increasing demand for electricity is reflected in the trends of sales to ultimate consumers shown in table 14. Total sales increased 7.2 percent in 1964, the latest year for which data are available. This included an increase of 8.3 percent for residential consumers, and 6.8 percent for industrial and commercial users.

Projections of Energy Demand.—Estimated future demand for energy resources

Table 11.—Supply and demand for petroleum,[1] domestic

	1964		p 1965	
	Million bbl	Trillion Btu	Million bbl	Trillion Btu
Supply:				
Crude oil:[2]				
Production	2,786.8	15,690.5	2,848.5	15,900.4
Imports	438.6	2,469.3	452.0	2,523.0
Exports	—1.4	—7.9	—1.1	—6.1
Stock change	7.3	41.1	9.8	54.7
Losses and transfers for use as crude	—8.0	—45.0	—8.4	—46.9
Total	3,223.3	18,148.0	3,300.8	18,425.1
Petroleum input runs to stills:				
Crude oil[2]	3,223.3	18,148.0	3,300.8	18,425.1
Transfers in natural gas liquids[3]	213.3	985.4	225.7	1,042.7
Total	3,436.6	19,133.4	3,526.5	19,467.8
Output:				
Refined products	3,436.6	19,133.4	3,526.5	19,467.8
Unfinished oils, net	27.3	152.0	32.1	201.8
Overage or loss	79.3	441.5	80.2	442.7
Total	3,543.2	19,726.9	3,638.8	20,112.3
Imports[4]	388.1	2,440.0	448.7	2,821.0
Exports	—72.5	—403.6	—66.8	—368.9
Stock change, including natural gas liquids	—11.0	—61.2	—6.8	—37.6
Transfers in, natural gas liquids[3,5]	209.2	810.6	215.9	833.8
Losses, gains, and unaccounted for	—22.8	—126.9	—27.4	—151.3
Total	4,034.2	22,385.8	4,202.4	23,209.3
Demand by major consuming sectors:				
Fuel and power:				
Household and commercial	777.0	4,349.6	843.7	4,743.4
Industrial	491.5	2,921.6	474.5	2,822.5
Transportation[6]	2,198.9	11,791.0	2,272.8	12,184.1
Electricity generation utilities	101.4	635.7	118.5	743.4
Other, not specified	71.0	411.2	77.4	457.5
Total	3,639.8	20,109.1	3,786.9	20,950.9
Raw material:[7]				
Petrochemical feedstock offtake	175.9	797.2	185.3	833.4
Other nonfuel use	203.9	1,306.0	214.4	1,375.8
Total	379.8	2,103.2	399.7	2,209.2
Miscellaneous and unaccounted for	14.6	173.5	15.8	49.2
Grand Total	4,034.2	22,385.8	4,202.4	23,209.3

p Preliminary.

1 Supply and demand for crude oil and petroleum products. Petroleum products include products refined and processed from crude oil, including still gas and liquefied refinery gas; also natural gas liquids transferred from natural gas.

2 Btu value for crude oil for each year shown is based on average British thermal unit value of total output of petroleum products (including refinery fuel and losses) adjusted to exclude natural gas liquids inputs and their implicitly derived values. Value for net imports of crude is based on the average value of crude runs to stills.

3 Btu values for natural gas liquids for each year shown are implicitly derived from weighted averages of major natural gas liquids, with natural gasoline and associated product converted at 110,000 Btu per gallon and liquefied petroleum gases at 95,500 Btu per gallon.

4 Btu value for imported refined products for each year shown is based on the value of residual fuel and unfinished oils. The value for exports of refined products is based on the average value of domestic petroleum products output.

5 Includes natural gas liquids other than those channeled into refinery input as follows: Petrochemical feedstocks, direct uses for fuel and power, and other uses.

6 Includes bunkers and military transportation.

7 Includes some fuel and power use by raw materials industries.

during the next 15 years and forecasts of economic indicators upon which the energy projections are based are shown in table 15. The projections are taken from an energy forecast for the United States to the year 1980 included in a paper prepared for presentation at the World Power Conference in Tokyo in October 1966.[3] Total gross consumption of energy in the forecast is projected at 88 quadrillion Btu for 1980, 64 percent above the 1965 level. Coal consumption is projected at 747 million tons, of which 10 million is anthracite and 737 million tons bituminous and lignite. This is 58 percent greater than consumption in 1965. It is estimated that two-thirds of the coal used in 1980 will be for utility power generation. Demand for natural gas is projected at 24,594 billion cubic feet for 1980, 58 percent greater than that of 1965. Approaching saturation of natural gas substitution with oil and coal in some markets, and an anticipated decline in gas use by electric utilities, are expected to slow the future growth of gas. Petroleum, including natural gas liquids, is expected to remain the nation's major energy source through 1980. The projection of 6,665 million barrels of domestic demand in 1980, is 41 percent of the total forecast energy demand for that year. While gasoline is expected to continue to make up the greater part of petroleum demand during the forecast period, the fastest growing petroleum component is expected to continue to be liquefied gas, the major source of feedstocks for the petrochemicals industry.

The electric utility sector is expected to maintain its rapid growth during the forecast period, with net generation in 1980 projected at 2,700 billion kilowatt-hours, 155 percent greater than that of 1965. Of the anticipated generation in 1980, it is estimated that 68 to 71 percent will come from conventional fuel-burning plants, where the major fuel source will continue to be coal; 12 percent from hydropower plants, and 17 to 20 percent from nuclear powerplants.

PHYSICAL STOCKS

There were no major shifts in the stock positions of the major energy resources during 1965. Stocks of bituminous coal, shown in table 16, increased by almost 2 million tons, and coke stocks by somewhat less than 1 million tons. These increases were in line with the rising trends of production and consumption of these energy sources. Crude petroleum and petroleum product stock changes were minimal during the year and for the most part downward. The greatest shifts were in products where the most significant increases in demand occurred, mainly gasolines and natural gas liquids. Natural gas underground storage also increased during the year.

TRANSPORTATION

Crude petroleum and refined products utilize pipeline, rail, water, and truck transportation while natural gas moves almost entirely by pipeline. Coal shipments are predominantly by rail with some water and truck movements.

Total petroleum pipeline mileage at the beginning of 1965 was 210,867 miles as shown in table 17. This was an increase of 5 percent over the 200,543 miles reported for 1962. Total pipeline fill at the beginning of 1965 was 100,694,000 barrels compared with the 1962 level of 86,123,000 barrels. Gas pipeline mileage shown in table 18 totaled 736,220 miles in 1964, the latest year for which data was available. This was an increase of about 4 percent over that of 1963. Natural gas lines comprised slightly more than 98 percent of the total, leaving less than 2 percent for the declining share of the pipeline total being used for manufactured, mixed, and liquefied petroleum gases.

Rail transportation continued to be the principal method for shipping coal in 1965. Table 19 shows that 73 percent of the total bituminous coal production during the year was shipped by railroad. As shown in table 20, coal accounted for 88 percent of total energy resources shipped by rail in

[3] Vogely, W. A. and W. E. Morrison, "Pattern of Energy Consumption in the United States, 1947 to 1965 and 1980 Projected." Paper 83 1A, World Power Conference, Tokyo, Japan. October 1966, 24 pp.

Table 12.—Petroleum consumption by major products [1] and by major consuming groups

	Household and commercial		Industrial		Transportation [2]		Electricity generation, utilities		Miscellaneous and unaccounted for		Total domestic product demand	
	Million bbl	Trillion Btu	Million bbl	Trillion Btu	Million bbl	Trillion Btu	Million bbl	Trillion Btu	Million bbl	Trillion Btu	Million bbl	Trillion Btu
1964												
Fuel and power:												
Liquefied gases	123.3	494.6	25.7	103.1	28.0	112.3	--	--	1.7	6.7	178.7	716.7
Jet fuel (kerosine and naphtha types)	--	--	--	--	199.7	1,095.8	--	--	4.6	25.2	204.3	1,121.0
Gasoline	--	--	--	--	1,657.9	8,700.7	--	--	--	--	1,657.9	8,700.7
Special naphthas	--	--	27.5	144.3	--	--	--	--	--	--	27.5	144.3
Kerosine	71.2	403.7	17.7	100.3	--	--	--	--	3.8	21.5	92.7	525.5
Distillate fuel	456.3	2,657.9	46.6	271.4	189.4	1,103.2	3.8	22.1	54.3	316.3	750.4	4,370.9
Residual fuel	126.2	793.4	200.2	1,258.7	123.9	779.0	97.6	613.6	6.6	41.5	554.5	3,486.2
Still gas	--	--	131.2	787.2	--	--	--	--	--	--	131.2	787.2
Petroleum coke	--	--	42.6	256.6	--	--	--	--	--	--	42.6	256.6
Total	777.0	4,349.6	491.5	2,921.6	2,198.9	11,791.0	101.4	635.7	71.0	411.2	3,639.8	20,109.1
Raw material: [3]												
Lubes and waxes	--	--	49.4	297.7	--	--	--	--	--	--	49.4	297.7
Petroleum coke [4]	--	--	27.8	167.5	--	--	--	--	--	--	27.8	167.5
Asphalt and road oil	126.7	840.8	--	--	--	--	--	--	--	--	126.7	840.8
Petrochemical feedstock offtake: [5]												
Liquefield refinery gas	--	--	47.1	188.9	--	--	--	--	--	--	41.7	188.9
Liquefied petroleum gas [6]	--	--	71.2	285.6	--	--	--	--	--	--	71.2	285.6
Naphtha (—400 degrees)	--	--	24.6	129.1	--	--	--	--	--	--	24.6	129.1
Still gas	--	--	7.7	46.2	--	--	--	--	--	--	7.7	46.2
Miscellaneous (+400 degrees)	--	--	25.3	147.4	--	--	--	--	--	--	25.3	147.4
Total	126.7	840.8	253.1	1,262.4	--	--	--	--	--	--	379.8	2,103.2
Miscellaneous and unaccounted for	--	--	--	--	--	--	--	--	14.6	173.5	14.6	173.5
Total domestic product demand	903.7	5,190.4	744.6	4,184.0	2,198.9	11,791.0	101.4	635.7	85.7	584.7	4,034.2	22,385.8
1965 p												
Fuel and power:												
Liquefied gases	127.3	510.6	19.1	76.6	28.4	113.9	--	--	2.0	8.0	176.8	709.1
Jet fuel (kerosine and naphtha types)	--	--	--	--	220.6	1,219.6	--	--	--	--	220.6	1,219.6

Gasoline	--	--	--	--	1,720.2	9,027.6	--	--	--	--	1,720.2	9,027.6
Special naphthas	--	--	29.8	156.4	--	--	--	--	--	--	29.8	156.4
Kerosine	79.2	449.0	18.4	104.3	--	--	--	--	--	--	97.6	553.3
Distillate fuel	481.0	2,801.8	52.8	307.6	185.6	1,081.1	3.6	21.0	53.0	308.7	776.0	4,520.2
Residual fuel	156.2	982.0	174.9	1,099.6	118.0	741.9	114.9	722.4	22.4	140.8	586.4	3,686.7
Still gas	--	--	135.3	811.8	--	--	--	--	--	--	135.3	811.8
Petroleum coke	--	--	44.2	266.2	--	--	--	--	--	--	44.2	266.2
Total	843.7	4,743.4	474.5	2,822.5	2,272.8	1[illegible]84.1	118.5	743.4	77.4	457.5	3,786.9	20,950.9
Raw material: [3]												
Lubes and waxes	--	--	50.8	308.1	--	--	--	--	--	--	50.8	308.1
Petroleum coke [4]	--	--	29.4	177.1	--	--	--	--	--	--	29.4	177.1
Asphalt and road oil	134.2	890.6	--	--	--	--	--	--	--	--	134.2	890.6
Petrochemical feedstock offtake: [5]												
Liquefied refinery gas	--	--	50.5	202.6	--	--	--	--	--	--	50.5	202.6
Liquefied petroleum gas [6]	--	--	80.0	320.9	--	--	--	--	--	--	80.0	320.9
Naphtha (—400 degrees)	--	--	23.5	123.3	--	--	--	--	--	--	23.5	123.3
Still gas	--	--	8.9	53.4	--	--	--	--	--	--	8.9	53.4
Miscellaneous (+400 degrees)	--	--	22.4	133.2	--	--	--	--	--	--	22.4	133.2
Total	134.2	890.6	265.5	1,318.6	--	--	--	--	--	--	421.2	2,295.4
Miscellaneous and unaccounted for	--	--	--	--	--	--	--	--	15.8	49.2	15.8	49.2
Total domestic product demand	977.9	5,634.0	740.0	4,141.1	2,272.8	12,184.1	118.5	743.4	93.2	506.7	4,202.4	23,209.3

p Preliminary.
[1] Includes liquefied refinery gas and natural gas liquids.
[2] Includes bunkers and military transportation.
[3] Includes some fuel and power use by raw material industries.
[4] Includes portions of petroleum coke estimated to be consumed in nonfuel uses.
[5] Partly estimated.
[6] Incldes LP gas for synthetic rubber.

Table 13.—U.S. gross consumption of energy resources by major sources and consuming sectors [1]

(Trillion Btu)

Consuming sectors	Anthracite	Bituminous and lignite	Natural gas, dry [1]	Petroleum [2]	Hydropower [3]	Nuclear power [3]	Total gross energy inputs [4]	Utility electricity purchased [5]	Total sector energy inputs [6]
Household and commercial:									
1961	129	783	4,477	5,028	---	---	10,417	1,385	11,802
1962	121	799	4,849	5,227	---	---	10,996	1,490	12,486
1963	103	671	5,027	5,258	---	---	11,059	1,645	12,704
1964	85	560	5,314	5,190	---	---	11,149	1,792	12,941
1965 p	79	546	5,534	5,634	---	---	11,793	1,937	13,730
Industrial:									
1961	46	4,693	r 6,471	3,682	---	---	14,892	1,306	16,198
1962	49	4,761	r 6,748	3,880	---	---	15,438	1,402	16,840
1963	57	5,015	r 7,159	3,994	---	---	16,225	1,464	17,689
1964	46	5,362	7,397	4,184	---	---	16,989	1,544	18,533
1965 p	49	5,640	7,685	4,141	---	---	17,515	1,634	19,149
Transportation: [7]									
1961	(neg)	22	391	10,575	---	---	10,988	19	11,007
1962	(neg)	20	396	11,001	---	---	11,417	17	11,434
1963	(neg)	19	439	11,506	---	---	11,964	19	11,983
1964	(neg)	20	448	11,791	---	---	12,259	20	12,279
1965 p	(neg)	19	518	12,184	---	---	12,721	21	12,742
Electricity generation, utilities: [3]									
1961	64	4,311	1,889	577	1,628	17	8,486	2,710	---
1962	58	4,580	2,034	579	1,780	23	9,054	2,909	---
1963	55	5,017	2,218	600	1,740	33	9,663	3,128	---
1964	57	5,353	2,403	636	1,873	34	10,356	3,356	---
1965 p	55	5,825	2,399	743	2,050	38	11,110	3,592	---
Miscellaneous and unaccounted for:									
1961	165	---	---	625	---	---	r 790	---	---
1962	135	---	---	580	---	---	r 715	---	---
1963	146	---	---	r 592	---	---	r 738	---	---
1964	177	---	---	585	---	---	762	---	---
1965 p	145	---	---	507	---	---	652	---	---
Total gross energy inputs:									
1961	404	9,809	13,228	20,487	1,628	17	45,573	---	---
1962	363	10,160	14,027	21,267	1,780	23	47,620	---	---
1963	361	10,722	14,843	r 21,950	1,740	33	r 49,649	---	---
1964	365	11,295	15,562	22,386	1,873	34	51,515	---	---
1965 p	328	12,030	16,136	23,209	2,050	38	53,791	---	---

p Preliminary. r Revised.

[1] Excludes natural gas liquids.

[2] Petroleum products including still gas, liquefied refinery gas, and natural gas liquids.

[3] Represents outputs of hydropower and nuclear power converted to theoretical energy inputs at prevailing rate of pounds of coal per kilowatt-hour at central electric stations, using 12,000 Btu per pound coal. Excludes inputs for power generated by nonutility plants which are included within the other consuming sectors.

[4] Gross energy is that contained in all types of commercial energy at time it is incorporated in economy, whether energy is produced domestically or imported. Gross energy comprises inputs of primary fuels (or the derivatives) and outputs of hydropower and nuclear power converted to theoretical energy inputs. Gross energy includes energy used for production, processing, and transportation of energy proper.

[5] Utility electricity, generated and imported, distributed to the other consuming sectors as energy resource inputs. Distribution to sectors is based on historical series in the Edison Electric Institute Yearbook. Conversion of electricity to energy equivalent by sector was made at the value of contained energy corresponding to 100 percent efficiency using a theoretical rate of 3,412 Btu per kilowatt-hour.

[6] Energy resource inputs by sector, including direct fuels and electricity distributed.

[7] Includes bunkers and military transportation.

Table 14.—Electrical energy sales to ultimate consumers in the United States

(Million kilowatt-hours)

Region	1959 Total consumption	1959 Residential [1]	1959 Industrial and commercial	1960 Total consumption	1960 Residential [1]	1960 Industrial and commercial
New England	24,790	8,701	15,237	26,570	9,213	16,434
Middle Atlantic	98,021	27,401	63,706	106,013	28,594	69,534
East North Central	139,596	37,393	96,380	147,088	39,541	102,033
West North Central	38,157	16,106	20,780	44,176	17,368	25,419
South Atlantic	77,763	26,648	48,676	86,388	29,368	54,334
East South Central	84,015	16,437	66,781	87,543	18,504	68,049
West South Central	51,612	15,220	33,766	57,363	17,290	37,013
Mountain	26,010	8,105	16,541	29,611	8,947	19,353
Pacific [2]	86,779	30,390	53,617	98,447	33,884	61,129
Total [2]	626,743	186,401	415,484	683,199	202,709	453,298
	1961 [3]			1962 [3]		
New England	28,652	10,140	17,432	30,558	10,738	18,655
Middle Atlantic	112,080	30,785	73,095	119,026	32,051	78,368
East North Central	151,885	41,748	104,358	162,756	44,046	112,397
West North Central	46,415	18,402	26,260	51,257	20,384	28,954
South Atlantic	93,274	32,129	57,601	102,766	34,915	63,918
East South Central	88,821	19,075	68,736	92,624	21,172	70,288
West South Central	60,399	17,331	39,831	68,930	20,412	45,069
Mountain	33,514	8,538	23,430	35,897	9,192	25,080
Pacific [2]	105,688	30,873	71,548	112,274	33,504	75,282
Total [2]	720,728	209,021	482,291	776,088	226,414	518,011
	1963 [3]			1964 [3]		
New England	32,086	11,263	19,596	34,207	12,013	20,889
Middle Atlantic	126,287	33,978	83,466	135,255	36,152	89,898
East North Central	172,816	45,914	120,037	182,871	49,058	126,920
West North Central	54,005	20,985	31,076	57,500	22,570	32,973
South Atlantic	110,782	37,653	68,885	120,891	41,482	75,004
East South Central	98,883	23,061	74,580	102,776	25,489	75,988
West South Central	76,946	22,969	49,993	83,938	25,100	54,574
Mountain	38,225	9,985	26,573	41,045	10,957	28,332
Pacific [2]	120,781	35,884	80,709	131,873	39,189	88,317
Total [2]	830,811	241,692	554,915	890,356	262,010	592,895

[1] Includes rural.
[2] Includes Alaska and Hawaii from 1960–64.
[3] Rural included in all three classes.

Source: Edison Electric Institute. Statistical Year Book of the Electric Utility Industry. Annually 1959 through 1964.

Table 15.—Projections: Mineral energy resources, electricity, and general economic indicators

	1965 actual	1980 projected	1965–80 projected growth rate (percent per year)
Population .... thousands	194,600	[1] 245,313	1.6
Labor force .... do	78,400	[2] 101,408	1.7
Gross national product .... billion 1958 dollars	609	[3] 1,071	3.9
Index of industrial production .... 1957–59=100	143	[3] 250	3.8
Energy consumption .... trillion Btu	53,791	[3] 88,073	3.3
Petroleum consumption, including natural gas liquids .... million barrels	4,202	[3] 6,665	3.1
Natural gas consumption, dry .... billion cubic feet	15,590	[3] 24,594	3.1
Coal consumption .... million tons	472	[3] 747	3.1
Electrical energy, utility, consumption .... billion kilowatt-hours	1,057	[4] 2,700	6.5

[1] Bureau of the Census. Current Population Reports. Series P–25, No. 286, 1964.
[2] Bureau of Labor Statistics. Special Labor Force Report No. 49, 1965.
[3] Bureau of Mines.
[4] Federal Power Commission. National Power Survey. 1964, 719 pp.

Table 16.—Physical stocks of mineral energy resources and related products at yearend

(Producers' stocks, unless otherwise indicated)

Fuel	1961	1962	1963	1964	p 1965
Coal and related products: [1]					
Bituminous and lignite [2] ____net tons__	74,449,230	72,577,910	73,028,665	77,939,559	79,739,516
Coke ____do____	4,041,873	3,906,811	2,884,931	1,971,892	2,702,946
Petroleum and related products: [3]					
Carbon black ______thousand pounds__	287,899	293,434	254,216	r 231,171	237,704
Crude petroleum and petroleum products ________thousand barrels__	825,074	834,296	835,559	839,235	836,344
Crude petroleum ____do____	244,664	252,011	237,361	230,057	220,289
Natural gas liquids ____do____	37,067	31,385	33,747	35,679	35,867
Gasoline and special naphthas ____do____	184,167	188,683	190,937	199,512	189,267
Distillate fuel oil ____do____	152,018	143,961	156,677	155,846	155,407
Residual fuel oil ____do____	44,869	49,775	47,538	40,403	56,214
Petroleum asphalt ____do____	12,999	14,252	14,354	r 14,231	16,178
Other refined products ____do____	149,290	154,229	154,945	163,507	163,122
Natural gas [4] ________billion cubic feet__	2,344	2,504	2,745	2,313	2,458

p Preliminary. r Revised.
[1] Series on anthracite stocks in ground storage has been discontinued.
[2] Stocks at industrial, consumer, and retail yards and on upper lake docks.
[3] Stocks of petroleum and related products are calculated on a new basis beginning with 1962 owing to products reclassification resulting from separately reported data for petrochemical feedstocks.
[4] American Gas Association.

1963, the last year for which data are available. Freight costs of bituminous coal shipped by rail have declined in recent years. These decreases have been made possible by increased use of the unit train, long-term coal contracts, and continued heavy shipments of coal by rail to coal's biggest market, electric utility powerplants. Liquefied petroleum gases and lubricants make up the bulk of the rail shipments of petroleum.

Water transportation of major energy resources is shown in table 21. In 1964, the latest year for which information is available, about one-third of the total water movement of energy resources was coal, while 17 percent was crude petroleum. Refined petroleum products, with gasoline being the largest component, accounted for 51 percent of total water transportation of energy resources.

LABOR AND PRODUCTIVITY

Employment.—Employment in the mineral energy resources industries, shown in table 22, declined in 1965, reflecting the continuing mechanization and automation of many phases of primary raw material production. In the mining sector, the greatest reductions in employment were in bituminous coal mining, and in the crude pe troleum and natural gas fields. In the manufacturing sector, employment in petroleum refining continued in its downward trend, while employment in other petroleum and coal products manufacturing activities increased slightly over the 1964 level. Total employment in the mining sector decreased by about 12,000 persons in 1965, and in the manufacturing sector by about 4,000 persons. Revisions in Bureau of Labor Statistics (BLS) data for 1964 and 1965, shown in table 22, are due to the use of a new benchmark (comprehensive count of employment) adjusted to March 1964 payroll data. Table 23 compared employment in the mineral energy resources industries as reported by three separate sources—the Bureau of Labor Statistics (BLS), the Bureau of Employment Security (BES), and the Bureau of Mines. Though the data for the three series are

Table 17.—Petroleum pipelines in the United States, selected years

(Miles)

Year	Trunklines: Crude	Trunklines: Products	Gathering lines	Total
1953 ____	75,228	27,236	68,040	170,504
1956 ____	78,594	36,420	73,526	188,540
1959 ____	70,317	44,483	75,182	189,982
1962 ____	70,355	53,200	76,988	200,543
1965 ____	72,383	61,443	77,041	210,867

Source: Bureau of Mines. Crude Oil and Products Pipelines, Triennial, Dec. 9, 1965, 7 pp.

Table 18.—Miles of utility gas main by type of gas and by type of main [1]

Type of gas and type of main	1955	1960 [2]	1961 [2]	1962 [2]	1963	p 1964
All types:						
Field and gathering	45,680	55,850	56,730	58,680	60,720	61,010
Transmission	145,970	183,660	191,840	196,380	200,940	205,400
Distribution	305,090	391,440	410,390	428,170	448,280	469,810
Total	496,740	630,950	658,960	683,230	709,940	736,220
Natural gas:						
Field and gathering	45,680	55,850	56,730	58,680	60,720	61,010
Transmission	142,490	181,770	189,990	194,970	200,020	204,730
Distribution	260,600	370,360	390,400	409,910	433,620	458,770
Total	448,770	607,980	637,120	663,560	694,360	724,510
Manufactured gas:						
Field and gathering	0	0	0	0	0	0
Transmission	420	20	30	20	[3]	[3]
Distribution	11,540	1,550	1,480	1,480	1,490	1,460
Total	11,960	1,570	1,510	1,500	1,490	1,460
Mixed gas:						
Field and gathering	0	0	0	0	0	0
Transmission	2,990	1,860	1,810	1,380	920	670
Distribution	28,450	17,590	16,640	15,080	11,890	8,310
Total	31,440	19,450	18,450	16,460	12,810	8,980
Liquified petroleum gas:						
Field and gathering	0	0	0	0	0	0
Transmission	70	10	10	10	0	0
Distribution	4,500	1,940	1,870	1,700	1,280	1,270
Total	4,570	1,950	1,880	1,710	1,280	1,270

p Preliminary.
[1] Excludes service pipe. Data not adjusted to common diameter equivalent. Mileage shown as of end of each year.
[2] Includes data for Hawaii subsequent to 1959 and for natural gas only for Alaska subsequent to 1960.
[3] Less than 5 miles.

NOTE: For earlier years please refer to Historical Statistics of the Gas Industry.

Source: American Gas Association. 1965. Gas Facts; a Statistical Record of the Gas Utility Industry; 1964 Data. New York. 251 pp.

Table 19.—Methods of shipment of bituminous coal and lignite from mines and mine use in the United States

Year	Method of shipment from mines			Used at mines [1]	Total production
	Shipped by rail and trucked to rail	Shipped by water and trucked to water	Trucked to final destination		
	Thousand net tons				
1961	293,546	46,348	51,044	12,039	402,977
1962	307,328	48,106	54,853	11,862	422,149
1963	333,989	50,664	60,901	13,374	458,928
1964	349,377	59,349	65,532	12,740	486,998
1965	371,544	60,289	68,302	11,953	512,088
	Percentage of total				
1961	72.9	11.5	12.6	3.0	100.0
1962	72.8	11.4	13.0	2.8	100.0
1963	72.8	11.0	13.3	2.9	100.0
1964	71.7	12.2	13.5	2.6	100.0
1965	72.6	11.8	13.3	2.3	100.0

[1] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for all other purposes at mine, and transported from mine to point of use by conveyor, tram, or pipeline.

Table 20.—Rail transportation of mineral energy resources and related products in the United States [1]

(Thousand short tons)

Product [2]	1962	1963	1964	Change from 1962 (percent)
Coal:				
Anthracite [3]	15,157	16,564	NA	+9
Bituminous	312,179	331,667	NA	+6
Coke	15,467	16,436	NA	+6
Crude petroleum	1,756	781	NA	—56
Gasoline	6,187	5,380	NA	—13
Distillate and residual fuel oils	6,209	5,812	NA	—6
Asphalt	2,853	2,894	NA	+1
Other [4]	15,284	16,140	NA	+2
Total	375,092	395,674	NA	+5

NA Not available.
[1] The source publication from which this series is taken has been discontinued. The last issue published contained the data for 1963. This table will be discontinued next year.
[2] Revenue freight originated, excluding forwarder and less than carload shipments, for which categories commodity detail is not available.
[3] Includes shipments to breakers and washeries.
[4] Includes lubricants, petroleum products, and gases.

Source: Interstate Commerce Commission. Freight Commodity Statistics. Class I railroads in the United States for 3 years ended December 31, from 1961 to 1963.

not strictly comparable, they generally tend to move together. However for 1965 Bureau of Mines preliminary data show an increase in bituminous coal employment, whereas BLS and BES data show declines from the 1964 level, with the highest decline of about 4,000 persons being featured in the BLS data. Anthracite employment continued to decline in 1965 reflecting the falling output in that industry.

Productivity.—The latest data available for the index of labor output in petroleum refining are for the year 1963, and for bituminous coal and lignite the data are for 1964. However the recent trends toward increased output due to mechanization and automation are believed to have continued into the current period, along with the increases in production per manhour. As shown in table 24, probuction per man-

Table 21.—Water transportation of mineral energy resources and related products in the United States, by products [1]

(Thousand short tons)

Product	1963	1964	Change from 1963 (percent)
Coal:			
Anthracite	423	390	—8
Bituminous	141,673	154,936	+9
Coke	573	558	—3
Crude petroleum	83,236	79,998	—4
Gasoline	98,177	93,782	—4
Distillate fuel oil	77,357	70,787	—8
Residual fuel oil	46,360	44,910	—3
Asphalt	r 4,500	5,059	+13
Kerosine	8,307	8,273	(2)
Other [3]	15,183	18,928	+22
Total	475,789	477,621	(2)

r Revised.
[1] Domestic traffic only: Traffic with Canal Zone, the Virgin Islands, and military cargoes carried in Department of Defense vehicles are excluded.
[2] Less than 0.5 percent.
[3] Includes lubricants, jet fuel, naphthene, and briquets.

Table 22.—Total employment in the mineral energy resources industries

(Thousands)

Year and month	Mining: Bituminous	Mining: Other coal	Mining: Crude petroleum and natural gas fields	Mining: Oil and gas field services	Mining: Total	Manufacturing: Petroleum refining	Manufacturing: Other petroleum and coal products [1]	Manufacturing: Total
1961	147.1	14.2	171.3	131.8	464.4	168.4	33.6	202.0
1962	140.0	11.9	167.6	130.4	449.9	160.5	34.7	195.2
1963	r 137.7	r 11.3	r 163.8	r 125.4	r 438.2	r 153.7	35.1	r 188.8
1964	r 136.0	r 11.5	r 159.6	r 129.8	r 436.9	r 148.4	r 34.4	r 182.8
1965:								
January	135.6	11.1	154.5	127.8	429.0	144.0	31.6	175.6
February	135.3	10.6	154.0	125.9	425.8	143.7	32.1	175.8
March	132.8	10.1	153.7	125.6	442.2	143.4	33.1	176.5
April	133.4	10.2	153.9	125.6	423.1	143.2	33.6	176.8
May	131.9	10.2	154.1	128.3	424.5	142.8	33.8	176.6
June	131.1	10.5	156.8	131.6	430.0	144.4	35.6	180.0
July	127.5	11.2	158.2	132.3	429.2	145.1	37.3	182.4
August	129.4	10.3	158.0	129.8	427.5	144.7	37.8	182.5
September	125.4	10.6	154.6	126.5	417.1	143.1	37.5	180.6
October	132.7	10.7	151.9	126.3	421.6	141.4	37.0	178.4
November	133.8	10.8	151.4	127.6	423.6	141.3	35.3	176.6
December	133.3	10.6	151.5	129.4	424.8	140.8	33.9	174.7
1965 Average	131.8	10.6	154.4	128.1	424.9	143.2	34.9	178.1

r Revised.
[1] Standard Industrial Classification Industry 295, paving and roofing materials included in total.
Source: U.S. Department of Labor, Bureau of Labor Statistics. Employment and Earnings Statistics for the United States, 1909–65, Bull. 1312–3, December 1965, 732 pp., and monthly reports December 1965 through March 1966.

Table 23.—Comparison of data on total employment in the mineral energy resources industries

(Thousands)

Year	Petroleum: BLS [1]	Petroleum: BES [2]	Bituminous coal: BLS [1]	Bituminous coal: BES [2]	Bituminous coal: Bureau of Mines	Anthracite: BLS [1]	Anthracite: BES [2]	Anthracite: Bureau of Mines
1961	303.1	294.1	147.1	145.6	150.5	14.2	12.8	15.8
1962	298.0	289.1	140.0	138.8	143.8	11.9	11.6	14.0
1963	r 289.2	280.2	r 137.7	135.5	141.6	r 11.3	11.2	13.5
1964	r 289.4	r 280.8	r 136.0	132.3	128.7	r 11.5	11.4	13.1
1965	282.4	279.8	131.9	130.9	133.7	10.5	9.6	11.1

r Revised.
[1] BLS: U.S. Department of Labor, Bureau of Labor Statistics. Employment and Earnings Statistics for the United States 1909–65 Bull. 1312–3, December 1965, 732 pp., monthly issues December 1965 through March 1966, Table B-2.
[2] BES: Bureau of Employment Security.

Table 24.—Index of labor output

(1957–59=100)

Year	Petroleum refining: Employee	Petroleum refining: Production worker	Petroleum refining: Production worker man-hour	Bituminous coal and lignite mining: Employee	Bituminous coal and lignite mining: Production	Bituminous coal and lignite mining: Production worker man-hour
1960	r 113.6	115.2	114.1	112.8	116.3	114.2
1961	r 120.6	122.8	122.0	125.3	129.9	127.2
1962	r 130.3	133.5	132.4	137.7	142.8	135.8
1963	p 136.7	p 140.0	p 140.3	153.2	158.5	143.4
1964 p	NA	NA	NA	167.1	173.1	155.2

r Revised. p Preliminary. NA Not available.
Source: U.S. Department of Labor. Bureau of Labor Statistics. BLS Report No. 301, Indexes of Output per Man-Hour for Selected Industries, 1939 and 1947–63. December 1965, pp. 6–7, 62–63.

Table 25.—Average hours and gross earnings of production workers in the mineral energy resources and related industries

Year and month	Mining											
	Total fuels [1]			Total coal mining			Bituminous coal			Crude petroleum and natural gas		
	Weekly earnings	Weekly Hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings
1961	$ 107.66	39.4	$ 2.75	$ 110.62	35.8	$ 3.09	$ 112.01	35.9	$ 3.12	$ 105.75	41.8	$ 2.53
1962	110.69	40.0	2.79	113.06	[2] 36.9	[2] 3.09	[2] 114.46	[2] 37.0	[2] 3.12	109.20	42.0	2.60
1963	115.40	40.9	2.84	119.89	[2] 38.8	[2] 3.12	[2] 121.43	[2] 38.9	[2] 3.15	112.52	42.3	2.66
1964	118.41	41.4	2.89	126.88	[2] 39.0	[2] 3.26	[2] 128.91	[2] 39.2	[2] 3.30	113.05	42.5	2.66
1965:												
January	123.48	41.4	2.99	135.83	39.6	3.43	138.80	40.0	3.47	115.45	42.6	2.71
February	122.04	40.8	3.00	135.88	39.5	3.44	138.50	39.8	3.48	113.01	41.7	2.71
March	122.18	41.1	2.99	134.31	39.3	3.42	137.36	39.7	3.46	114.36	42.2	2.71
April	122.28	40.9	3.02	134.41	39.1	3.43	137.07	39.5	3.47	114.66	42.0	2.73
May	125.35	42.0	3.03	138.40	40.0	3.46	141.40	40.4	3.50	117.15	42.6	2.75
June	124.67	41.6	3.00	142.27	41.0	3.47	145.67	41.5	3.51	113.97	41.9	2.72
July	122.85	NA	NA	134.46	NA	NA	137.11	NA	NA	116.03	42.5	2.73
August	126.47	42.1	3.01	141.98	40.8	3.48	144.67	41.1	3.52	117.12	42.9	2.73
September	123.53	41.0	3.02	135.29	39.1	3.46	137.90	39.4	3.50	116.47	42.2	2.76
October	126.60	41.9	3.03	143.24	41.4	3.46	146.30	41.8	3.50	115.92	42.0	2.76
November	122.55	40.4	3.05	129.78	37.4	3.47	131.98	37.6	3.51	117.87	42.4	2.78
December	128.77	42.2	3.06	142.96	41.2	3.47	146.02	41.6	3.51	119.69	42.9	2.79
1965 average	124.23	41.4	3.01	137.38	[2] 39.9	[2] 3.45	140.23	[2] 40.2	[2] 3.49	115.90	42.3	2.74

Year and month	Manufacturing								
	Petroleum refining and related industries			Petroleum refining			Other petroleum and coal products		
	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings
1961	$ 124.31	41.3	$ 3.01	$ 129.24	40.9	$ 3.16	$ 102.10	42.9	$ 2.38
1962	126.88	41.6	3.05	131.43	41.2	3.19	107.75	43.1	2.50
1963	131.27	41.7	3.16	137.45	41.4	3.32	108.28	42.8	2.53
1964	133.66	41.9	3.19	139.52	41.4	3.37	112.75	43.7	2.58
1965:									
January	133.81	41.3	3.24	140.42	41.3	3.40	107.90	41.5	2.60
February	131.78	40.8	3.23	137.97	40.7	3.39	107.64	41.4	2.60
March	134.05	41.5	3.23	140.15	41.1	3.41	112.32	43.2	2.60
April	139.07	42.4	3.28	147.05	42.5	3.46	108.94	41.9	2.60
May	137.80	42.4	3.25	143.72	41.9	3.43	116.33	44.4	2.62
June	137.38	42.4	3.24	143.52	41.6	3.45	117.59	45.4	2.59
July	139.10	42.8	3.25	144.21	41.8	3.45	122.43	46.2	2.65

August	138.35	42.7	3.24	143.03	41.7	3.43	123.47	45.9	2.69
September	142.68	43.5	3.28	148.94	42.8	3.48	123.66	45.8	2.70
October	141.10	42.5	3.32	147.49	41.9	3.52	119.97	44.6	2.69
November	142.97	42.3	3.38	150.78	42.0	3.59	114.65	43.1	2.66
December	140.53	41.7	3.37	148.87	41.7	3.57	110.77	41.8	2.65
1965 average	138.42	42.2	3.28	145.05	41.8	3.47	115.90	43.9	2.64

NA Not available.
[1] Revised weighted average using employment of production workers as weight.
[2] 11-month average.
Source: U.S. Department of Labor, Bureau of Labor Statistics. Employment and Earnings for the United States, 1909–65, Bull. 1312.3, December 1965, 732 pp., and monthly issues December 1965 through March 1966.

Table 26.—Average labor turnover rates, mineral energy resources and related industries

(Per thousand employees)

Rates and year	All manufacturing	Petroleum refining and related industries [1]	Petroleum refining	Coal mining
Total accession rate:				
1961	41	13	9	22
1962	41	14	9	17
1963	39	16	10	21
1964	40	16	11	17
1965	43	18	12	17
Total separation rate:				
1961	40	17	12	27
1962	41	18	14	28
1963	39	20	14	21
1964	39	18	13	18
1965	40	19	13	19
Layoff rate:				
1961	22	6	3	19
1962	20	6	3	19
1963	18	7	3	12
1964	17	7	4	9
1965	14	6	4	9

[1] Standard Industrial Classification Industry 295, paving and roofing materials included in total.
Source: U.S. Department of Commerce, Bureau of Labor Statistics. Employment and Earnings Statistics for the United States 1909–65, Bull. 1312–3, December 1965, 732 pp., monthly issue March 1966.

Table 27.—Index of average unit mine value of minerals produced in the United States, by group and subgroup [1]

(1957–59=100)

Year	All minerals	Mineral energy resources			Metals total	Nonmetals total
		Total	Coal	Crude oil and natural gas [2]		
1956	96.2	93.9	97.7	92.4	111.3	97.5
1957	101.1	101.6	103.3	101.5	101.2	99.4
1958	99.5	99.8	99.1	100.0	97.5	99.4
1959	99.1	98.1	96.9	98.1	102.0	101.1
1960	99.7	98.3	94.9	99.0	103.3	102.5
1961	99.7	98.7	93.0	100.6	101.8	102.1
1962	100.0	99.0	91.1	101.4	102.8	101.8
1963	99.6	98.4	89.8	101.5	105.4	101.2
1964	99.9	98.0	91.2	100.7	110.3	101.9
1965 p	100.1	97.8	90.6	100.3	114.6	101.5

p Preliminary.
[1] Revised using 1957–59 weights. For description of index see "Review of Minerals Industries" chapter in Minerals Yearbook, v. 1, 1959, pp. 22–24.
[2] Does not cover isopentane, LP gases, and other natural gas liquids.

Table 28.—Index of implicit unit value of minerals produced in the United States, by group and selected subgroup

(1957–59=100)

Year	All minerals	Mineral energy resources			Metals total	Nonmetals total
		Total	Coal	Crude oil and natural gas		
1961	101.1	100.5	93.0	101.3	102.8	100.4
1962	101.6	r 101.2	91.0	102.9	103.6	99.7
1963	101.4	100.8	r 89.5	103.1	r 106.8	98.9
1964	102.0	100.2	r 90.8	r 102.4	114.6	99.1
1965 p	102.9	100.6	90.7	102.9	119.1	99.0

r Revised. p Preliminary.

Table 29.—Average monthly wholesale price indexes for selected mineral energy resources

(1957–59=100, unless otherwise specified)

Year and month	Wholesale price indexes all commodities	Fuels and related products, and power	Coal	Anthracite	Coke	Gas fuels [1]	Electric power [1]	Crude petroleum [2]	Petroleum products refined
1961	100.3	100.7	97.7	95.7	103.6	r 118.7	102.4	97.5	99.3
1962	100.6	100.2	96.8	94.2	103.6	119.2	102.8	97.7	98.2
1963	100.3	99.8	96.9	96.0	103.6	122.8	102.0	97.3	97.2
1964	100.5	97.1	96.9	98.2	106.3	121.3	101.1	96.9	92.7
1965:	102.5	98.9	96.5	93.7	107.3	124.1	100.8	96.7	95.9
January	101.0	98.5	98.3	101.4	107.3	121.4	101.1	96.7	95.2
February	101.2	97.9	98.3	101.4	107.3	124.1	100.8	96.7	93.9
March	101.3	97.9	97.3	101.4	107.3	124.1	100.8	96.7	94.0
April	101.7	97.6	94.6	88.7	107.3	122.5	100.8	96.7	94.1
May	102.1	98.4	94.6	88.7	107.3	122.2	100.8	96.7	95.4
June	102.8	98.7	94.7	88.7	107.3	122.7	100.8	96.7	96.0
July	102.9	98.7	95.2	91.2	107.3	122.5	100.7	96.7	96.0
August	102.9	99.0	95.8	91.2	107.3	123.9	100.8	96.7	96.4
September	103.0	99.2	96.6	91.2	107.3	125.3	100.8	96.7	96.4
October	103.1	99.4	97.3	93.5	107.3	125.8	100.8	96.7	96.6
November	103.5	100.3	97.5	93.5	107.3	126.8	100.8	96.7	98.1
December	104.1	100.6	97.6	93.5	107.3	128.6	100.7	96.9	98.4

r Revised.
[1] January 1958=100.
[2] Not included in the group, "Fuels and related products, and power."

Source: U.S. Department of Labor. Bureau of Labor Statistics. Monthly Labor Review, v. 89, No. 3, March 1966, p. 360. Wholesale Prices and Price Indexes, monthly issues from February 1965 through January 1966.

hour increased about 8 percent in 1963 in petroleum refining and for bituminous coal about 11 percent in 1964.

Average Hours and Gross Earnings.—Hourly earnings of production workers in mineral energy resources and related industries, shown in table 25, increased in both the mining and manufacturing sectors in 1965. In the mining sector, gains in hourly earnings averaged $0.19 for the year in bituminous coal, and $0.08 in crude petroleum and natural gas. The average hourly earnings of bituminous coal workers remained the highest in the mining sector. In the manufacturing sector in 1965, workers in petroleum refining ranked first in hourly earnings and showed the highest average increase during the year.

Labor-Turnover Rates.—Average labor turnover rates in the mineral energy resources industries, in terms of accession, separations, and layoffs, are shown in table 26. During 1965 there was no appreciable change in these rates from the previous year. Accession rates were up slightly, except in coal mining where these remained at about the same rate as that of 1964.

PRICES AND COSTS

Value.—The index of average unit value of minerals produced, shown in table 27, has been revised using 1957–59 weights. In 1965, the index value of the mineral energy resources component declined slightly for the third consecutive year. This was the result of lower prices paid to producers of coal, crude oil, and natural gas at the point of production. The index of implicit unit value, shown in table 28, is designed to represent real price changes of mineral commmodities. This is derived by dividing the index of physical volume into the index of value.

Prices.—The wholesale price index for fuels and related products and power, shown in table 29, was up 1.8 percent in 1965, reversing the downward trend which characterized the period in 1961–64. The wholesale price indexes for refined petroleum products, gas fuels, and coke increased 3.2 percent, 2.8 percent, and 1.0,

Table 30.—Comparative mineral energy resource prices

Fuel	1964	1965
Bituminous coal:		
Average prices:		
Average retail price ---------- dollars per net ton	[1]	[1]
Costs of coal at merchant coke ovens ---------- do----	9.85	9.65
Anthracite, average sales realization per net ton at preparation plants, excluding dredge coal:		
Chestnut ---------- dollars--	12.92	12.17
Pea ---------- do----	10.82	10.02
Buckwheat No. 1 ---------- do----	9.69	9.03
Petroleum and petroleum products:		
Crude petroleum, average price per barrel at well ---------- do----	2.88	2.86
Gasoline, average dealers net price (excluding taxes) of gasoline in 55 U.S. cities [2] ---------- cents per gallon--	14.82	15.38
Residual fuel oil:		
No. 6 fuel, average of high and low prices in Philadelphia [2] dollars per barrel (refinery)--	3.05	3.10
Bunker C, average price for all Gulf ports [2] ---------- do----	2.10	2.10
Distillate fuel oil:		
No. 2 distillate, average of high and low prices at Philadelphia [2] cents per gallon (refinery)--	9.24	9.53
No. 2 distillate, average price for all Gulf ports [2] ---------- do----	8.13	8.58
Natural gas:		
Average U.S. value at well ---------- cents per thousand cubic feet--	15.4	15.2
Average U.S. value at point of consumption ---------- do----	51.6	51.4

[1] Series discontinued.
[2] Platt's Oil Price Handbook.

Table 31.—Cost of fuel in steam-electrical power generation, United States

(Cents per million Btu)

Region	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas
	1959			1960			1961		
New England	37.7	35.8	34.5	36.5	36.0	35.6	36.2	37.7	36.3
Middle Atlantic	30.8	35.5	33.0	30.0	35.1	35.7	29.9	36.2	37.7
East North Central	25.6	73.2	[1] 24.5	25.3	65.5	[1] 25.3	25.0	64.7	26.4
West North Central	27.5	46.7	22.4	27.0	43.4	23.0	26.2	47.4	22.8
South Atlantic	27.2	35.5	29.7	26.3	35.6	31.8	25.8	35.2	32.5
East South Central	19.1	47.1	23.4	19.6	50.3	24.8	19.7	50.9	25.4
West South Central	15.8	43.2	15.0	32.3	45.1	16.7	--	43.8	19.0
Mountain	21.3	24.3	25.7	20.2	25.0	27.8	19.6	25.6	28.5
Pacific	--	34.8	32.0	--	32.3	33.4	--	32.6	35.2
Average	26.5	35.2	22.3	26.0	34.5	23.8	25.8	35.5	25.1
	1962			1963			1964		
New England	35.5	36.1	35.1	34.1	34.7	34.6	33.4	34.4	34.2
Middle Atlantic	29.0	34.2	37.2	27.2	32.1	33.3	26.0	31.7	33.5
East North Central	24.9	70.5	25.7	24.8	69.8	24.9	24.6	68.2	24.8
West North Central	26.6	49.7	23.8	26.4	50.1	23.8	26.0	50.4	24.3
South Atlantic	25.6	34.6	32.3	25.5	34.4	32.6	25.4	33.9	32.2
East South Central	19.3	48.9	25.4	20.0	47.5	24.5	19.3	50.1	24.6
West South Central	--	42.2	19.5	16.6	38.3	19.4	14.9	42.6	19.6
Mountain	22.7	25.1	29.0	20.4	27.4	27.7	19.2	25.7	26.6
Pacific	--	33.6	34.8	--	33.0	36.1	--	30.7	32.2
Average	25.6	34.5	26.4	25.0	33.5	25.9	24.6	32.6	25.3

[1] Excludes blast-furnace gas, which would lower cost slightly.

Source: National Coal Association. Steam-Electric Plant Factors. Annually, 1959 through 1964.

Table 32.—Cost of electrical energy per kilowatt-hour

(Cents)

Region	1959 Total	1959 Residential [2]	1959 Commercial and industrial	1960 Total	1960 Residential	1960 Commercial and industrial	1961 [1] Total	1961 [1] Residential	1961 [1] Commercial and industrial
New England	2.6	3.2	2.1	2.5	3.2	2.1	2.5	3.1	2.1
Middle Atlantic	2.1	3.0	1.7	2.0	2.9	1.7	2.0	2.9	1.7
East North Central	1.7	2.6	1.4	1.7	2.7	1.4	1.7	2.6	1.4
West North Central	2.3	2.9	1.9	2.2	2.8	1.8	2.2	2.8	1.5
South Atlantic	1.8	2.4	1.5	1.8	2.4	1.5	1.8	2.3	1.5
East South Central	.8	1.6	.6	.8	1.5	.7	.9	1.5	.7
West South Central	1.8	2.8	1.4	1.8	2.7	1.4	1.8	2.7	1.5
Mountain	1.6	2.3	1.3	1.5	2.3	1.2	1.5	2.4	1.2
Pacific	1.4	1.8	1.1	1.4	1.8	1.1	1.4	1.9	1.1
Total [3]	1.7	2.5	1.3	1.7	2.4	1.3	1.7	2.4	1.4
	1962			**1963**			**1964**		
New England	2.5	3.1	2.1	2.5	3.1	2.1	2.4	3.0	2.0
Middle Atlantic	2.0	2.9	1.6	2.0	2.8	1.6	1.9	2.8	1.6
East North Central	1.7	2.6	1.4	1.7	2.6	1.4	1.7	2.5	1.4
West North Central	2.2	2.7	1.8	2.2	2.7	1.8	2.1	2.6	1.7
South Atlantic	1.7	2.3	1.4	1.7	2.2	1.4	1.7	2.2	1.4
East South Central	.9	1.5	.7	.9	1.4	.7	.9	1.4	.7
West South Central	1.8	2.6	1.4	1.7	2.5	1.4	1.7	2.5	1.3
Mountain	1.5	2.3	1.2	1.5	2.3	1.3	1.5	2.3	1.2
Pacific	1.4	1.9	1.1	1.3	1.8	1.1	1.3	1.8	1.1
Total [3]	1.7	2.4	1.4	1.6	2.4	1.3	1.6	2.3	1.3

[1] Beginning with 1961 rural included in all 3 classes.
[2] Includes rural.
[3] Includes Alaska and Hawaii for 1960–64.

Source: Edison Electric Institute. Statistical Year Book of the Electric Utility Industry. Annually 1959 through 1964.

respectively. These items combined to outweigh the declines indicated for the coal, anthracite, electric power, and crude petroleum indexes. Comparative prices for the major fossil fuels are shown in table 30.

Fuel Costs, Electricity Generation.—The average cost of fuels consumed in steam electric power generation, shown in table 31, decreased for the three categories, coal, oil, and gas. However, of the total fuels consumed by the steam electric utilities in 1964, coal produced 65 percent of the total amount burned while oil and gas produced 7 percent and 28 percent, respectively. The price differential by region points up the significance of transportation costs in these industries.

Electricity Costs.—The average cost of electricity was virtually unchanged in 1964, although rates in several regions declined slightly. As shown in table 32, the U.S. residential rate per kilowatt-hour was 77 percent higher than the average of the combined commercial and industrial rate in 1964, the last year for which data are available.

Table 33.—Index of major input expenses for bituminous coal and crude petroleum and natural gas mining [1]

(1957–59=100)

Year	Bituminous coal	Crude petroleum natural gas
1961	91	100
1962	88	99
1963	86	99
1964	84	99
1965	85	100

[1] Index based on weights derived from the 1958 Census of Mineral Industries and on data from U.S. Department of Labor, Bureau of Labor Statistics, Wholesale Price Index, annual and monthly releases.

Table 34.—Indexes of relative labor cost, bituminous coal and petroleum mining

(1957-59=100)

Year	Index of labor costs per unit of output [1]		Index of value of product per man-period [2]		Index of labor costs per dollar of product	
	Bituminous coal	Petroleum	Bituminous coal	Petroleum	Bituminous coal	Petroleum
1961	86	100	114	108	92	103
1962	82	98	118	114	89	102
1963	r 76	98	r 125	119	r 85	101
1964	75	98	132	121	84	102
1965	76	98	139	125	84	102

r Revised.

[1] Bituminous index based upon net tons per man per day (See chapter on Bituminous Coal in volume 2 of Minerals Yearbook) and index of average earnings derived from Bureau of Labor Statistics data on hourly earnings; petroleum index based on barrels per year (see chapter on Petroleum in volume 2 of Minerals Yearbook) and Bureau of Employment Security data on total wages in petroleum production.

[2] Bituminous index based on net tons per man per day and mine values of production; petroleum index based on average employment and total value of production.

[3] Bituminous index based on index of value per man per day and index of average earnings; petroleum index based on total value of production and total wages.

The index of major input expenses for fossil fuels mining, as shown in table 33, indicates changes in operating costs, rather than the actual cost of producing these fuels because capital costs are omitted. The upswing in the index of input expenses for bituminous coal in 1965 reverses the downward trend evident for the past several years. This would indicate that continuing wage increases were not offset by productivity advances as had been true in the recent past.

Relative Labor Cost.—In the indexes of relative labor costs, shown in table 34, the average earnings by productivity are adjusted to indicate the movement of real labor cost per dollar of product obtained, the value of product per man-period, and the labor costs per unit of output. For bituminous coal, the index of labor cost per unit of output increased in 1965, while petroleum remained unchanged. The index of value of product per man-period continued to show steady gains for both items,

Table 35.—Wholesale price indexes of selected machinery and equipment items

(1957-59=100)

Year	Oilfield machinery and tools	Mining machinery and equipment	Power cranes, draglines, shovels, etc.	Construction machinery and equipment	Specialized construction machinery
1961	101.8	107.8	105.4	107.5	107.8
1962	103.2	108.4	106.1	107.8	107.4
1963	102.6	109.1	108.8	109.6	108.1
1964	r 104.3	r 110.5	111.8	112.4	108.5
1965	104.7	113.3	113.7	115.3	110.3
	Portable air compressors	**Scrapers and graders**	**Contractor's air tools, handheld**	**Mixers, pavers, spreaders, etc.**	**Tractors other than farm**
1961	114.1	104.4	113.5	108.4	108.0
1962	113.7	105.3	113.5	110.3	108.5
1963	115.1	108.5	113.5	112.1	110.8
1964	117.6	110.8	[1]	116.3	114.7
1965	128.7	114.2	[1]	119.8	117.6

r Revised.

[1] Series discontinued January 1964.

Source: Bureau of Labor Statistics. 1962 Statistical Supplement, Monthly Labor Review, p. 79, and Wholesale Prices and Price Indexes, January 1966.

Table 36.—National income by industrial origin in selected industries

Industry	1963 (millions) r	1964 (millions) r	Change from 1963 (percent) r	1965 (millions)	Change from 1964 (percent)
All industries	$481,927	$517,281	+ 7.3	$559,020	+ 8.1
Mining	5,954	5,950	— 0.1	6,432	+ 8.1
Metal mining	785	883	+12.5	1,025	+16.1
Coal mining	1,212	1,284	+ 5.9	1,361	+ 6.0
Crude petroleum and natural gas	2,917	2,658	— 8.9	2,775	+ 4.4
Nonmetallic mining and quarrying	1,040	1,125	+ 8.2	1,271	+13.0
Manufacturing	143,839	155,078	+ 7.8	170,408	+ 9.9
Petroleum refining and related industries	4,597	4,667	+ 1.5	5,063	+ 8.5

r Revised.

Source: U.S. Department of Commerce, Office of Business Economics. Survey of Current Business, July 1966.

while the indexes of labor costs per dollar of product remained at the 1964 level.

Machinery Prices.—Wholesale price indexes of selected machinery and equipment important to the mineral-energy resources industry are shown in table 35. All indexes show increases for 1965, with oilfield machinery and tools having the least increase and portable air compressors having the greatest increase.

INCOME AND INVESTMENT

During 1965 national income generated by the mineral energy resources industries increased substantially both in the mining and manufacturing sectors. In the mining sector, shown in table 36, the largest percentage gain for energy resources in 1965 was in coal mining. However, the absolute gain in income from crude petroleum and natural gas still exceeded that of coal during the year. In the manufacturing sector, income generated by petroleum refining increased 8.5 percent, exceeding the average income gain for all industries during the year.

Expenditures on new plant and equipment by energy industries and other selected mining and manufactuing sectors are shown in table 37. In the mining and manufacturing phases of the energy industries these expenditures were generally up during 1965. Greatest gains in the manufacturing sector were in chemicals and allied products which includes the petrochemicals industry, and in the coal and petroleum products category which includes chemical feedstocks. In the mining sector, which includes fuels, there were significant increases in investment in new plant and equipment, although these are not broken down by energy industry.

The book value of direct private investment by U.S. companies abroad in foreign petroleum enterprises is shown in table 38. This investment increased by almost 1 billion dollars in 1965. Direct investment by petroleum companies remained the major category of U.S. foreign investments. An

Table 37.—Expenditures on new plant and equipment by firms in mining and selected mineral manufacturing industries

(Billion dollars)

	1963	1964	1965
Mining[1]	1.04	1.19	1.30
Manufacturing:			
Primary iron and steel	1.24	1.69	1.93
Primary nonferrous metals	.41	.48	.68
Stone, clay, and glass products	.61	.68	.78
Chemical and allied products	1.61	1.97	2.59
Petroleum and coal products	2.92	3.36	3.82
All manufacturing	15.69	18.58	22.45

[1] Including fuels.

Source: U.S. Department of Commerce, Office of Business Economics. Survey of Current Business, June 1965, p. 6; June 1966, p. 12.

Table 38.—Direct private investment of U.S. companies in foreign petroleum industries, 1965

(Million dollars; net inflows to the United States (—))

	Petroleum				All industries			
	Book value beginning of year	Net capital outflows	Undistributed earnings of subsidiaries	Book value end of year	Book value beginning of year	Net capital outflows	Undistributed earnings of subsidiaries	Book value end of year
Canada	3,187	161	66	3,320	13,796	896	540	15,200
Latin America	3,102	—80	21	3,034	8,894	171	298	9,371
Other Western Hemisphere	488	—5	7	500	1,311	89	39	1,437
Europe	3,102	372	—51	3,429	12,109	1,432	381	13,894
Africa	883	130	7	1,020	1,685	160	47	1,904
Middle East	1,240	246	3	1,491	1,332	254	3	1,590
Far East	814	106	—26	893	1,780	184	58	2,021
Oceania	453	41	5	499	1,593	142	80	1,811
International	1,064	41	20	1,133	1,885	43	80	2,017
Total [1]	14,334	1,013	52	15,320	44,386	3,371	1,525	49,245

[1] Totals do not add due to rounding.

Source: U.S. Department of Commerce, Office of Business Economics. Survey of Current Business, September 1966, pp. 30–35.

important factor in the continuing increase in U.S. petroleum investment abroad is the reinvestment abroad of undistributed profits of U.S. subsidiaries and the rising market value of foreign securities held. Total direct foreign investment in the United States in 1965 and the value of the petroleum component are shown in table 39.

BUREAU OF MINES ACTIVITIES

The industrial strength and security of the United States requires an adequate, dependable, and continuous supply of raw materials, of which energy resources are an indispensible part. Bureau of Mines programs relating to the energy economy have traditionally been concerned with the conservation and development of mineral energy resources. More recently, increasing emphasis has been placed on problems of minimizing adverse effects on human environment arising from the extraction, processing, and utilization of these resources. The need to preserve environmental quality has assumed major significance because the expanding national requirements for raw materials have increased pollution problems.

Work continued during 1965 under the Bureau's established programs for mineral resources development. In addition to analysis of problem areas relating to energy supply and demand, new emphasis was placed on the development of more precise and sophisticated techniques for forecasting key components of the energy economy, both for the short term and for mid-term periods up to 15 years. A number of the energy problems evaluated and analyzed under the resource and development programs become subjects of research and investigation under the Bureau's programs

Table 39.—Value of foreign direct investments in the United States

(Millions of dollars)

Industry	1961	1962	1963	1964	1965
Total	7,392	7,612	7,944	8,363	8,812
Petroleum	1,325	1,419	1,513	1,612	1,710

Source: U.S. Department of Commerce, Office of Business Economics. Survey of Current Business, September 1966, pp. 30–35.

Table 40.—Research and development activity

	Funds expended (million dollars)					
	Total		Company		Federal Government	
	1963	p 1964	1963	p 1964	1963	p 1964
Petroleum refining and extraction	313	337	293	310	20	27
Percent of all industries	2.5	2.5	5.4	5.4	0.3	0.4
Chemicals and allied products	1,279	1,284	1,016	1,054	263	230
Percent of all industries	10.1	9.6	18.8	18.3	3.6	3.0
All industries	12,686	13,353	5,406	5,753	7,280	7,600

p Preliminary.

Source: National Science Foundation, Review of Data on Science Resources, No. 7, January 1966, Table 4.

for minerals research. Bureau accomplishments and findings under these programs are reflected in Bureau publications, published as continuing series or as special reports.

Among the more significant Bureau activities in the energy sector during 1965 were new developments in oil-shale research. The first stage of a multimillion dollar program of oil-shale experimentation, being carried out with the financial backing of the private sector, was completed. This program involves perfection of technology to form the basis for a commercial enterprise to produce petroleum-like materials from the vast oil-shale deposits of Colorado, Utah, and Wyoming. Other oil-shale research work included a project for the determination of the feasibility to fracture and retort oil-shale underground by such techniques as the use of high-voltage electricity to burn pathways through deposits, and the use of nuclear explosives to create a subsurface chimney of crushed shale.

Work also continued during the year on the search for new potential markets for coal through more efficient and economic uses of coal in generating power, in supplying coke for metallurgical use, and in processing liquid fuels or high Btu gas from coal. Of particular note is the encouraging progress made in a research project on the potential use of bituminous coal as a raw material for a variety of carbon black uses. During the year the Bureau continued to lead the Federal Government's cooperative effort with industry to stimulate the sale of United States coal abroad.

Antipollution projects related to energy resources were conducted singly or jointly during 1965 with other Government agencies. These included the preparation for pilot plant testing of a Bureau process for the economic means of removing sulfur dioxide from industrial stack gases; research in the pollution caused by acid mine water; research in the problems of removing sulfur from coal before it is burned in industrial furnaces; the adaption of nuclear techniques and materials for the rapid analysis of sulfur in coal; relating the components of auto exhaust to such variables as the physical and chemical properties of various gasolines and additives, engine design, operation, and fuel-air mixture.

Obligations of funds by the Bureau of Mines for its mineral resources development programs, research programs and related activities during fiscal year 1966 totaled 31.4 million dollars. Of these obligations, 13.2 million dollars were obligated for programs relating to mineral energy resources and related activities. Table 40 shows national expenditures for research and development activities in both the Federal and private sectors in 1964, the latest year for which data are available. Federally financed research during that year continued to exceed expenditures for all industries in the private sector. Among the energy industries, petroleum refining remained the major source of research expenditures, with company financing dominating this segment. In chemicals, which includes petrochemicals and coal chemicals, the private sector remained the heaviest participant in 1964, with the Federal Government contribution declining 33 million dollars below the 1963 level.

Table 41.—Regional distribution of U.S. imports and exports of selected mineral energy resources and related products, 1965

(Thousand dollars)

SITC No.[1]	Group	North America[2]	South America	Europe	Asia	Africa	Oceania	Soviet Bloc
321	Coal, coke, etc.:							
	Imports	$13,436	$23	$1,425	$3	$---	$---	$228
	Exports	157,406	21,837	229,229	77,294	91	158	8,025
331	Petroleum, crude, etc.:							
	Imports	335,213	507,629	701	293,809	50,390	---	---
	Exports	1,522	---	2,311	1,086	---	---	---
332	Petroleum products:							
	Imports	416,816	431,664	3,852	10,828	567	[3]	387
	Exports	99,198	32,974	108,470	128,566	22,169	14,796	2,307
341	Gas, natural, manufactured:							
	Imports	113,145	561	75	57	---	---	---
	Exports	27,317	555	6,304	275	22	---	---
	Total selected mineral fuels:							
	Imports	878,610	939,877	6,053	304,697	50,957	[3]	615
	Exports	285,443	55,366	346,314	207,221	22,282	14,954	10,832
521	Mineral tar and crude chemicals from coal, petroleum, natural gas:							
	Imports	1,271	---	7,772	74	---	12	146
	Exports	2,697	1,579	11,336	8,199	396	552	87
	Grand total:							
	Imports	879,881	939,877	13,825	304,771	50,957	12	761
	Exports[4]	288,140	56,945	357,650	215,420	22,678	15,506	10,869

[1] Standard Internatonal Trade Classification.
[2] Includes Trinidad and Netherlands Antilles.
[3] Less than ½ unit.
[4] Total includes $4,778,000 special category exports not designated by region.

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Exports of Domestic and Foreign Merchandise, 1965, FT420.

Table 42.—Value of imports and exports, mineral energy resources, and products

(Thousands)

SITC No.	Group	Imports for consumption 1963	Imports for consumption 1964	Imports for consumption 1965	Exports of domestic merchandise 1963	Exports of domestic merchandise 1964	Exports of domestic merchandise 1965
321	Coal, coke, etc.	$6,301	$16,233	$15,115	$482,058	$473,579	$494,259
331	Petroleum, crude, etc.	1,065,107	1,148,069	1,187,742	4,616	3,806	4,923
332	Petroleum products	707,535	725,103	864,114	441,008	415,028	412,682
341	Gas, natural and manufactured	103,753	106,702	113,838	17,853	19,081	34,640
	Total: mineral fuels, lubricants, and related products	1,882,696	1,996,107	2,180,809	945,535	911,494	946,504
521	Tar, crude chemicals	34,977	8,727	9,275	65,438	79,590	24,977
	Grand total	1,917,673	2,004,834	2,190,084	1,010,973	991,084	971,481

Source: U.S. Department of Commerce, Bureau of the Census. U.S. Exports of Domestic and Foreign Merchandise FT410, December 1965, and U.S. Imports of Merchandise for Consumption, 1965, FT125.

INTERNATIONAL

The value of regional distribution of U.S. imports and exports of major energy resources is shown in table 41. Coal exports to Western Europe, the main export market for U.S. coal, declined by about 11 million dollars. This was more than offset by increased exports to Canada. Direct imports of crude petroleum from South America, mainly Venezuela, declined, while the value of crude imports from Trinidad and the Netherlands Antilles, a portion of which originate in Venezuela, increased in 1965. Crude petroleum imports from the Middle East also expanded significantly during the year. The value of petroleum products imported from South America, mainly Venezuela, and from Trinidad and the Netherlands Antilles, increased in 1965. Fuel oil remained the predominant component in these product imports. Exports of petroleum products to Europe declined appreciably in value during the year. The

Table 43.—World production, U.S. production and consumption, selected mineral energy resources

Commodity	World production selected mineral energy resources	U.S. production: Amount	U.S. production: Percent of world production	U.S. apparent consumption: Amount	U.S. apparent consumption: Percent of world production
1964					
Crude petroleum ....thousand barrels..	r 10,309,116	r 2,786,822	27	r 3,232,769	31
Natural gas ....million cubic feet..	NA	r 15,462,667	NA	15,536,373	NA
Bituminous and lignite thousand short tons..	r 2,828,962	486,998	17	431,116	15
Anthracite ....do....	r 209,700	17,184	8	14,400	7
1965					
Crude petroleum ....thousand barrels..	11,063,154	2,848,514	26	3,310,322	30
Natural gas ....million cubic feet..	NA	16,039,753	NA	16,027,000	NA
Bituminous and lignite thousand short tons..	2,880,566	512,088	18	459,164	16
Anthracite ....do....	208,900	14,866	8	12,900	6

r Revised. NA Not available.

value of exports of natural gas from Canada to the United States increased moderately.

The value of imports of mineral energy resources and related products, shown in table 42, exceeded the 1964 level by $87 million. The greater part of this expansion was in petroleum products imports, the value of which increased about $139 million, and crude petroleum imports, the value of which was $39 million greater than that of 1964. Despite the increase in probuction of crude petroleum in the United States in 1965, this was again a smaller portion of total world production as shown in table 43. Commercial production of natural gas and consumption in the United States continued to dominate the world gas picture, although aggregate data are not available on commercial consumption abroad. Bituminous coal production in the United States, which has been expanding at an impressive rate, constituted a higher percentage of world production in 1965 than during the previous year.

Employment and Injuries in the Fuel Industries

By Forrest T. Moyer

General injury experience in the mineral fuel industries was less favorable in 1965. Of the major industry groups, the coal mining and the coke industries had higher injury-frequency and severity rates than in 1964. The oil and gas industries had an increased rate of occurrence of injuries although the severity rate improved. However, in the relatively small peat and native asphalt industries, the injury experience was more favorable than in 1964.

Overall operating activity for the mineral fuel industries, as measured by the average number of men working daily and the total worktime, was higher than in 1964. Moderate declines in employment and worktime in the coal and peat industries were more than offset by gain in the other groups.

In addition to the industry classifications included in this chapter, similar injury, employment, and worktime data on the metal, nonmetal, stone and aggregate industries are presented in volume I. Corresponding data for broad classifications of mineral industry groups are given by States in volume III of the Minerals Yearbook.

COAL

Injury experience (fatal and nonfatal) of the coal-mining industry was less favorable in 1965 than in 1964. The frequency rate of 45.79 injuries per million man-hours of exposure was 2 percent higher than in 1964 and the severity rate advanced to 8,947 days lost per million man-hours, 6 percent more than in 1964. The fatality total for 1965 was 258 deaths, an increase of 16 over the 1964 record. This total includes 21 lives lost in three major disasters comprising a mine fire with 7 fatalities in a West Virginia mine and two mine explosions, one in a Colorado mine with 9 fatalities and one in a Tennessee mine with 5 fatalities. In 1964 the coal-mining industry was free of major disasters. Nonfatal injuries totaled 11,102 in 1965, an increase of less than 1 percent over the 1964 total. Coal mines were active 212 days in both 1965 and 1964. However, employment and worktime decreased 2 percent each in 1965 owing principally to the continued decline in activity in anthracite mining. Employment and injury statistics for 1965 are based on final data for anthracite mines and preliminary data for bituminous coal and lignite mines.

Bituminous Coal Mines.—The safety record at bituminous coal and lignite mines in 1965, according to preliminary data, was less favorable than in 1964. The combined (fatal and nonfatal) frequency rate of 44.39 injuries per million man-hours of exposure was 4 percent above 1964 and the severity rate of 9,230 days lost per million man-hours increased 11 percent.

Fatal injuries increased 32 in number in 1965. Part of this increase was attributed to three major disasters that claimed 21 lives. No major disasters occurred in 1964. The fatal frequency and severity rates of 1.08 and 6,474, respectively, were both 15 percent higher than the corresponding 1964 rates of 0.94 and 5,637. Of the 250 fatalities, 214 occurred in underground workings, 17 on the surface, 18 at strip mines, and 1 at an auger mine. Four types of accident caused 83 percent of the overall death total. Falls of roof, face, or rib killed 126 men (50 percent); haulage accidents took 40 lives (16 percent); machinery accounted for 27 fatalities (11 percent); and explosions claimed 14 lives (6 percent). The remaining fatalities resulted from a variety of causes such as electricity, explosives, and others. The Bureau of Mines estimated that 10,035 nonfatal injuries occurred in 1965 at a frequency rate of 43.31 and a severity rate of 2,757 per million man-hours of exposure. In comparison with 1964 data, nonfatal injuries increased 3 percent in number and 3 percent each in the frequency and severity rates.

Bituminous coal mines were active 213 days in 1965, 1 more day than in 1964. However, average daily employment and the total man-hours of worktime declined less than 1 percent each.

Anthracite Mines.—Injury experience for anthracite mines was improved in 1965, as measured by a 2-percent decrease in the injury-frequency rate and a 49-percent decrease in the injury-severity rate.

Fatal injuries dropped to 8, a 67-percent improvement over 1964 and a record low for the anthracite industry. Deaths occurred at a rate of 0.49 per million man-hours in 1965 as compared to 1.18 per million man-hours in 1964. The severity rate of fatalities (2,931) was 59 percent better than the 1964 rate (7,070). All of the eight fatalities reported in 1965 occurred in underground workings. Falls of roof, face, or rib claimed five lives; inrush of water and material, two; and haulage, one. Nonfatal injuries totaled 1,067 in 1965 and occurred at a frequency rate of 65.16 and a severity rate of 2,004 per million man-hours of exposure. Compared with 1964 data, nonfatal injuries decreased 20 percent in number, 1 percent in the frequency rate, and 22 percent in the severity rate. Records show that 700 of the nonfatal injuries occurred underground, 31 on the surface, 146 at strip mines, 13 at culm banks, 1 at a dredge, 14 at shops, and 162 at preparation plants. Employment continued to decline with 15 percent fewer men working than in 1964. Employees worked 20 percent fewer man-hours and averaged 1,471 hours for the year, 79 hours less than in 1964. Anthracite mines were active 204 days, 10 less than in 1964.

Table 1.—Employment and injury experience at coal mines in the United States, 1961–65

Industry and year	Average men working daily [1]	Average active mine days [2]	Man-days worked (thousand)	Man-hours worked (thousand)	Number of injuries		Injury rates per million man-hours	
					Fatal	Nonfatal	Frequency	Severity
Bituminous coal mines: [3]								
1961	151,776	194	29,453	232,871	275	9,902	43.70	9,778
1962	147,276	196	28,863	228,267	263	9,783	44.01	9,712
1963	143,628	204	29,289	232,136	252	9,838	43.47	8,834
1964	137,617	212	29,200	232,037	218	9,728	42.86	8,312
1965 p	137,000	213	29,153	231,710	250	10,035	44.39	9,230
Anthracite mines:								
1961	15,792	196	3,098	22,424	19	1,295	58.60	7,702
1962	14,010	204	2,853	20,680	26	1,161	57.40	9,421
1963	13,498	216	2,912	21,048	32	1,295	63.05	12,367
1964	13,144	214	2,812	20,368	24	1,342	67.07	9,650
1965	11,132	204	2,271	16,375	8	1,067	65.65	4,936
Total coal mines: [4]								
1961	167,568	194	32,551	255,296	294	11,197	45.01	9,596
1962	161,286	197	31,716	248,946	289	10,944	45.12	9,688
1963	157,126	205	32,200	253,185	284	11,133	45.09	9,128
1964	150,761	212	32,012	252,405	242	11,070	44.82	8,420
1965 p	148,132	212	31,424	248,085	258	11,102	45.79	8,947

p Preliminary.

[1] Average number of men at work each day mine was active. Because absenteeism and labor turnover were considered, this number is lower than number of men available for work, as measured by a count of names on payroll.

[2] Average in which operating time of each mine is weighted by average number of workers in mines.

[3] Includes lignite.

[4] Data may not add to total shown because of rounding.

COKE

In the coking industry both the injury frequency and severity rates were less favorable than in 1964. Seven fatalities were reported in 1965 compared with 1 in the preceding year and the number of nonfatal disabilities increased 12 percent. The rate of occurrence of all injuries was 8 percent above 1964 and the severity rate more than doubled to 1,805 days lost per million man-hours of work in 1965.

Operating activity was appreciably higher and the average number of men working gained 8 percent over that of 1964. Total man-hours of worktime increased 6 percent in 1965 and the plants were active an average of 352 days.

Slot Ovens.—Injuries (fatal and nonfatal) at slot ovens increased 21 percent in number and 14 percent in frequency of occurrence per million man-hours of worktime. Employment increased 8 percent in 1965 and man-hours gained 6 percent over 1964. Slot-oven employees worked an 8-hour shift while producing 69,234,787 tons of coke (and breeze). The plants were active an average of 357 days.

Beehive Ovens.—The safety record at beehive-oven plants was improved substantially. No fatalities occurred in 1965, for the third consecutive year, and nonfatal injuries decreased 10 percent in number and 24 percent in frequency compared with 1964. There also was a marked improvement in the injury-severity rate. Employment and man-hours increased 22 and 19 percent, respectively, and the men averaged 1,708 hours for the year while working a 7.7-hour shift.

Table 2.—Employment and injury experience at coke ovens in the United States, 1961–65 [1]

Industry and year	Average men working daily [2]	Average active plant days [3]	Man-days worked (thousand) [4]	Man-hours worked (thousand) [4]	Number of injuries		Injury rates per million man-hours	
					Fatal	Nonfatal	Frequency	Severity
Slot ovens:								
1961	13,106	359	4,707	37,661	3	167	4.51	NA
1962	12,723	363	4,623	36,969	9	237	6.65	NA
1963	12,696	356	4,524	36,192	7	190	5.44	NA
1964	13,021	362	4,713	37,675	1	164	4.38	703
1965	14,003	357	4,998	39,984	7	192	4.98	1,816
Beehive ovens:								
1961	428	196	84	645	----	26	40.33	NA
1962	357	191	68	533	2	15	31.89	NA
1963	347	209	73	567	----	23	40.57	NA
1964	426	220	94	743	----	40	53.83	5,457
1965	518	222	115	885	----	36	40.68	1,318
All ovens:								
1961	13,534	354	4,791	38,306	3	193	5.12	NA
1962	13,080	359	4,691	37,502	11	252	7.01	NA
1963	13,043	352	4,596	36,759	7	213	5.98	NA
1964	13,447	357	4,807	38,418	1	204	5.34	795
1965	14,521	352	5,113	40,869	7	228	5.75	1,805

NA Not available.

[1] All data are final.

[2] Average number of men at work each day oven was active. Because absenteeism and labor turnover are taken into consideration, this number is lower than the number of men available for work, as measured by a count of names on payroll.

[3] Average in which operating time of each plant is weighted by average number of workers in the plant.

[4] Man-days and man-hours of employment have been rounded to the nearest thousand and will not necessarily add to published totals.

OIL AND GAS

Injury rates in the oil and gas industries in 1965 increased in frequency but improved in severity. The frequency rate of 9.70 injuries per million man-hours was 2 percent above that of 1964 but the severity rate of 934 days lost per million man-hours decreased 20 percent. Although the total number of injuries was 4 percent higher than the 1964 figure, the number of fatalities dropped 28 percent to an unprecedented low since these data were first recorded by the Bureau in 1942. Fewer fatalities and a decrease of 30 percent in the number of permanent total injuries were the principal reasons for the reduced severity rate. Ninety-five percent of all injuries in 1965 were temporary total disabilities.

Disabling injuries included 78 fatalities, 7 permanent total, 339 permanent partial, and 8,617 temporary total disabilities. For permanent partial and temporary total disabilities the average time loss was 40 days, a decline of 1 day from 1964. Average severity of all injuries in 1965 was 96 days, whereas, in 1964 it was 123 days.

In six segments of the industry the frequency of occurrence of injuries was reduced; however, the number of injuries per million man-hours increased in exploration, drilling, pipeline oil, marine transportation (inland waters), refining, and marketing segments. Severity rates of injuries improved in all areas except natural gasoline, marine transportation (ocean and coastwise), and refining. The remaining nine departments were responsible for the 238-day drop in the severity rate of all injuries. Both the frequency and severity rates were reduced in the production, pipeline gas, research and engineering, and miscellaneous departments. Refining alone had higher injury rates in both frequency and severity than in 1964.

Table 3.—Employment and injury experience of the oil industry (all activities) and the natural gas industry (excluding distribution activities) in the United States, 1961–65

Year	Average men working daily	Man-hours worked (thousand)	Number of injuries[1]		Injury rates per million man-hours	
			Fatal	Nonfatal	Frequency	Severity
1961	452,721	951,743	111	8,697	9.25	1,077
1962	469,256	984,172	121	9,336	9.61	1,124
1963	461,021	974,877	93	9.125	9.46	1,040
1964	427,697	910,525	109	8,551	9.51	1,172
1965	436,935	931,645	78	8,963	9.70	934

[1] Fatal and permanent total injuries combined for 1961 through 1962. Permanent total injuries included in the nonfatal injury total thereafter.

PEAT

In the extraction and processing of peat the number of nonfatal injuries dropped 46 percent in 1965 compared with 1964. Thirteen injuries occurred at the rate of 16.57 per million man-hours of exposure. Of these, 3 were in extraction, at a frequency rate of 7.76, and the remaining 10 occurred in processing operations at a rate of 25.14 per million man-hours. There were no fatalities in 1965.

Of the 13 nonfatal injuries, 2 were permanent partial disabilities, 1 from a handling material accident and the other from machinery. Handling material accidents accounted for five of the temporary total injuries; slips or falls of persons and machinery three each, and stepping or kneeling on sharp or loose objects and haulage one each.

A total of 623 employees, 20 percent less than in 1964, had an average work year of 1,259 hours each. The decline in employment was accompanied by a 30 percent decrease in man-hours worked.

Table 4.—Employment and injury experience in the peat industry in the United States, 1961–65

Year	Average men working daily	Man-hours worked (thousand)	Number of injuries		Injury rates per million man-hours	
			Fatal	Nonfatal	Frequency	Severity
1961	765	1,038	----	17	16.38	747
1962	683	977	----	19	19.46	300
1963	674	957	----	11	11.49	510
1964	781	1,122	----	24	21.39	1,851
1965	623	784	----	13	16.57	593

NATIVE ASPHALT

A total of 27 injuries at native asphalt operations in 1965 resulted in a frequency rate of 29.45 per million man-hours of exposure. There were 15 injuries underground, including 1 fatality due to an inrush of water. One nonfatal injury was reported at surface operations, four in open-pits, and seven in processing plants. Of the 26 nonfatal injuries, machinery accidents were the leading cause with 6 injuries; 5 were from slips or falls of persons; 4 resulted from handling material; 3 each from falling material or objects and all other; 2 from working with handtools; and 1 each resulted from stepping or kneeling on sharp or loose objects, haulage, and inrush of water. The injury-severity rate of 7,945 days lost per million man-hours decreased 52 percent from the 1964 figure. The number of men employed increased 21 percent and man-hours increased 20 percent above the previous year.

Table 5.—Employment and injury experience at bituminous limestone, bituminous sandstone, and gilsonite mines and mills in the United States, 1961–65

Year	Average men working daily	Average active days	Man-days worked (thousand)	Man-hours worked (thousand)	Number of injuries		Injury rates per million man-hours	
					Fatal	Nonfatal	Frequency	Severity
1961	383	256	98	792	1	30	39.17	8,766
1962	358	279	100	800	----	13	16.25	146
1963	417	260	108	873	2	35	42.41	14,576
1964	369	256	94	762	2	30	41.97	16,701
1965	448	253	113	917	1	26	29.45	7,945

Coal—Bituminous and Lignite

By W. H. Young [1] and J. J. Gallagher [2]

Contents

GENERAL SUMMARY

In response to increasing national energy requirements, highlighted by the continuing growth in demand for coal for the generation of electric power, the output of bituminous coal and lignite in 1965 passed the 500-million-ton mark for the first time since 1956, thus emphasizing the steady upward trend from the recent low of 403 million tons in 1961. There were corresponding upward trends in consumption, exports, mechanization, and productivity.

Production.—The output of bituminous coal and lignite in the United States in 1965—512 million tons—was 5 percent greater than the 487 million tons produced in 1964. The gain was attributed largely to expanded consumption by the electric utilities, greater use at coke ovens, and an increase in exports.

The major seasonal fluctuation in production, as in the past, resulted from the miners' vacation period of 12 days in midsummer. According to the Bureau of Labor Statistics, U.S. Department of Labor, time lost because of strikes totaled 258,000 man-days in 1965, compared with 340,000 man-days in 1964.

Trend of Employment.—Employment in 1965 indicates a continuation of the downward trend that has prevailed for more than a decade, owing largely to increasing mechanization. Conversely, output per man day has continued its steady upward trend, which has more than doubled during the past 12 years.

Index to Capacity.—Since it is impossible for all mines to operate every working day in the year, an estimate of 280 days for calculating potential capacity was suggested some years ago by the coal committee of the American Institute of Mining, Metallurgical, and Petroleum Engineers. The average output per day worked in 1965 was 2.3 million tons, which if applied to 280 days, gives an annual potential output of

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[2] Supervisory industry economist, Division of Bituminous Coal.

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655 million tons, compared with the actual production of 512 million tons. This figure is not a measure of practical productive capacity of the industry because availability of railroad coal cars and other factors bearing on the ability of the industry to produce are not reflected in this computation.

Mechanization.—Coal output that was loaded mechanically at underground mines in the United States totaled 89 percent—2 percent greater than in the previous year.

Mechanical Cleaning.—Approximately 65 percent of the bituminous coal and lignite mined in the United States in 1965 was mechanically cleaned. The growth of mechanical cleaning closely paralleled that of mechanical mining partly because more refuse was loaded with the coal. Moreover, the bituminous coal and lignite industry has attempted to meet the consumer demand for cleaner coal. A large part of the remaining 35 percent was handpicked and screened into various sizes at tipples where no mechanical cleaning facilities existed.

Consumption.—Consumption of bituminous coal and lignite in the United States increased 7 percent, principally in electric utilities and at coke ovens. The remaining principal types of consumers used slightly more coal than in the previous year.

Trends of Fuel Efficiency.—For the fifth time in as many years, the fuel efficiency of electric power utilities failed to establish a new record; it remained at 0.86 pound per kilowatt-hour, the same as in 1961, 1962, 1963, and 1964.

Competition with Oil and Gas.—Coal's contribution to total energy consumption in the United States in 1965 maintained the slight upward trend that began in 1963, after a steady decline since 1920 as a result of competition from oil and natural gas. Of total energy consumed in 1965, bituminous coal and lignite furnished 22 percent and anthracite 1 percent, compared with 40 percent for oil, 33 percent for natural gas, and 4 percent for water power.

Electric utilities consumed 8.6 percent more bituminous coal, 0.2 percent less gas, and 13.9 percent more fuel oil in 1965.

Stocks.—The reserve supply of bituminous coal and lignite in the hands of industrial consumers and retail coalyards was 77 million tons at the end of the year, or 3 percent greater than for the previous year. Days supply remained at 56 days, the same as for the previous year. Stocks on the upper lake docks decreased 251,043 tons from January 1 to December 31, 1965.

Exports.—Exports totaled 50 million tons, increasing 5 percent over those of 1964; 34 million tons was shipped overseas and 16 million tons was shipped to Canada.

SCOPE OF REPORT

These data include all coal produced in the United States except Pennsylvania anthracite, Texas lignite, and bituminous coal and lignite from mines that produced less than 1,000 tons per year.

Throughout the chapter all tonnage figures show tons of marketable coal excluding washery and other refuse. "Tons" refers to net or short tons of 2,000 pounds.

Statistics are final and are based upon detailed annual reports of production and mine operation furnished by producers, or as otherwise noted. All but a small percentage of the output was covered by the reports submitted. For production not directly reported (chiefly that of small mines), data were obtained from the records of the various State mine departments (which have statutory authority to require such reports) or in a few instances, from railroad carloadings. Thus, complete coverage of all mines producing 1,000 tons per year or more is reported herein. Inclusion of many small mines that produce less than 1,000 tons per year was not attempted.

From 1955 to date the annual production form did not request information on employment. These figures for men working daily, days worked, man-days worked, and tons per man per day are based on data obtained from the Accident Analysis Branch of the Bureau of Mines.

Statistical methods are also detailed in the following sections: "Production by Months and Weeks," "Number and Size of Mines," "Mechanical Cleaning," "Production by States and Counties," "Consumption," and "Stocks."

Table 1.—Salient statistics of the bituminous coal and lignite industry in the United States

Item	1964	1965	Change from 1964 (percent)
Production ... net tons	486,997,952	512,088,263	+5.2
Consumption ... do	431,116,000	459,164,000	+6.5
Stocks at end of year:			
Industrial consumers and retail yards ... do	75,342,000	77,393,000	+2.7
Stocks on upper lake docks ... do	2,597,559	2,346,516	−9.7
Imports and exports: [1]			
Imports ... do	293,059	184,399	−37.1
Exports ... do	47,969,423	50,181,361	+4.6
Price indicators, average per net ton:			
Cost of coking coal at merchant coke ovens	$9.85	$9.65	−2.0
Railroad freight charge [2]	$3.11	NA	---
Value f.o.b. mines (sold in open market)	$4.11	$4.13	+.5
Value f.o.b. mines	$4.45	$4.44	−.2
Equipment sold:			
Mobile loading machines	111	(3)	---
Continuous mining machines	150	(3)	---
Augers	26	(3)	---
Shuttle cars	311	(3)	---
Conveyors:			
Gathering and haulage	204	(3)	---
Room or transfer	70	(3)	---
Method of mining:			
Hand loaded underground ... net tons	40,707,408	36,028,245	−11.5
Mechanically loaded underground ... do	281,100,506	296,632,991	+5.5
Percentage of total underground production mechanically loaded	87.4	89.2	+2.1
Mined by stripping ... net tons	151,858,979	165,240,769	+8.8
Mined at auger mines ... do	13,331,059	14,186,258	+6.4
Mechanically cleaned ... do	310,202,742	332,225,863	+7.1
Number of mines	7,630	7,228	−5.3
Average number of days worked [4]	225	219	−2.7
Average number of men working daily [4]	[5] 128,698	133,732	+3.9
Production per man per day [4]	16.84	17.52	+4.0
Fuel efficiency indicator: Pounds of coal per kilowatt-hour at electric powerplants [6]	0.86	0.86	---

NA Not available.
[1] Bureau of the Census, U.S. Department of Commerce.
[2] Interstate Commerce Commission.
[3] Canvass discontinued.
[4] Based on data supplied by the Accident Analysis Branch, Federal Bureau of Mines.
[5] Incomplete coverage.
[6] Federal Power Commission.

DOMESTIC PRODUCTION

THICKNESS OF BITUMINOUS COAL AND LIGNITE SEAMS

The Bureau of Mines compiled and published detailed data on thickness of seams for coal mines in 1960.[3] Because of the importance of seam thickness in mining, these data for 1960 follow.

PRODUCTION BY MONTHS AND WEEKS

The figures on monthly and weekly production are estimates based upon railroad carloadings of coal reported daily and weekly by all important carriers, shipments on the Allegheny and Monongahela Rivers reported by the U.S. Army Engineers, direct reports from mining companies, and monthly production statements compiled by certain local operators associations and State mine departments. In computing the estimates, allowance is made for commercial truck shipments, local sales, colliery fuel, and small truck mines producing over 1,000 tons a year.

Preliminary estimates are made currently and published in the Weekly Coal Reports. These preliminary estimates have proved very reliable and for many years have been within approximately 1 percent of the final figure of total production, based upon complete coverage of all mines producing over 1,000 tons per year. The preliminary estimates are later revised to agree with the final total production based on the canvass. Thus, the monthly and weekly estimates of production, summarized in tables 7 to 9, represent final figures and vary slightly from the preliminary figures of production published in the Weekly Coal Reports.

[3] Young, W. H., and R. L. Anderson. Thickness of Bituminous Coal and Lignite Seams Mined in 1960. BuMines Inf. Circ. 8118, 1962, 19 pp.

Table 2.—Coal reserves of the United States, January 1, 1960, by States

(Million short tons)

State	Date of publication of estimate	Estimated original reserves: Bituminous coal	Subbituminous coal	Lignite	Anthracite and semianthracite	Total	Reserves depleted to Jan. 1, 1960: Production [1]	Production plus loss in mining [2]	Remaining reserves, Jan. 1, 1960	Recoverable reserves, Jan. 1, 1960, assuming 50 percent recovery
Alabama [3]	(4)	[5] 13,754	-----	20	-----	[5] 13,774	[6] 23	[6] 46	13,728	6,864
Alaska	(7)	21,401	[8] 71,136	(8)	2,101	94,638	13	26	94,612	47,306
Arkansas	1960	1,816	-----	350	456	2,622	99	198	2,424	1,212
Colorado	1959	63,203	18,492	-----	90	81,785	506	1,012	80,773	40,387
Georgia	1953	100	-----	-----	-----	100	12	24	76	38
Illinois	1953	137,329	-----	-----	-----	[9] 137,329	[10] 474	[10] 948	136,381	68,190
Indiana	1953	37,293	-----	-----	-----	37,293	1,148	2,296	34,997	17,499
Iowa [11]	1909	29,160	-----	-----	-----	29,160	357	714	28,446	14,223
Kansas	B–1951 L–1952	[9] 20,774	-----	(12)	-----	[9] 20,774	[10] 13	[10] 26	20,748	10,374
Kentucky	(4)	72,318	-----	-----	-----	72,318	2,646	5,292	67,026	33,513
Maryland	1953	[9] 1,200	-----	-----	-----	[9] 1,200	[10] 6	[10] 12	1,188	594
Michigan	1950	297	-----	-----	-----	297	46	92	205	102
Missouri	1913	79,362	-----	-----	-----	79,362	287	574	78,788	39,394
Montana	1949	2,363	132,151	87,533	-----	222,047	171	342	221,705	110,853
New Mexico	1950	10,948	50,801	-----	6	61,755	125	250	61,505	30,753
North Carolina	1955	112	-----	-----	-----	112	1	2	110	55
North Dakota	1953	-----	-----	350,910	-----	350,910	96	192	350,718	175,359
Ohio	1960	46,488	-----	-----	-----	46,488	2,052	4,104	42,384	21,192
Oklahoma	1957	3,673	-----	(12)	-----	3,673	180	360	3,313	1,656
Oregon	1955	20	180	-----	-----	200	3	6	194	97
Pennsylvania	B–1928 A–1945	75,093	-----	-----	22,805	97,898	13,508	27,016	70,882	35,441
South Dakota	1952	-----	-----	2,033	-----	2,033	1	2	2,031	1,015
Tennessee	1959	[13] 1,912	-----	-----	-----	[13] 1,912	[14] 6	[14] 12	1,900	950
Texas [15]	B–1909 L–1955	8,000	-----	7,070	-----	15,070	95	190	14,880	7,440
Utah	(7)	28,222	156	-----	-----	28,378	260	520	27,858	13,929
Virginia	1952	11,696	-----	-----	355	12,051	782	1,564	10,487	5,244
Washington	1929	11,413	[8] 52,442	(8)	23	63,878	149	298	63,580	31,790
West Virginia	1940	116,618	-----	-----	-----	116,618	6,369	12,738	103,880	51,940
Wyoming	1950	13,235	[8] 108,319	(8)	-----	121,554	402	804	120,750	60,375
Other States	----	[16] 620	[17] 4,065	[18] 50	-----	4,735	7	14	4,721	2,360
Total	----	808,420	437,742	447,966	25,836	1,719,964	[19] 29,837	59,674	1,660,290	830,145

[1] Production, 1800 through 1885, from "The first century and a quarter of American coal industry," by H. N. Eavenson, privately printed, Pittsburgh, 1942; production, 1886 through 1923, from U.S. Geological Survey Mineral Resources, annual volumes; production, 1924 through 1957, from Bureau of Mines, Minerals Yearbook, annual volumes, augmented for some States by records of State mine inspectors; production, 1958, from Bureau of Mines, Mineral Market Summary 2974, Sept. 9, 1959; production, 1959, from Bureau of Mines weekly coal reports and partly estimated.

[2] Assuming past losses equal past production.

[3] Reserve estimates of States in capital letters supersede earlier estimates of M. R. Campbell.

[4] New estimate from report in preparation or in press.
[5] Remaining reserves, Jan. 1, 1958.
[6] Production 1958 and 1959 only.
[7] New estimate presented for first time in this report.
[8] Small reserves and production of lignite included under subbituminous coal.
[9] Remaining reserves, Jan. 1, 1950.
[10] Production 1950 through 1959.
[11] Reserve estimates of States in lowercase letters were prepared by or under the direction of M. R. Campbell before 1928.
[12] Small reserves of lignite in beds generally less than 30 inches thick.
[13] Remaining reserves, Jan. 1, 1959.
[14] Estimated production 1959 only.
[15] New estimate of lignite reserves; Campbell estimate of bituminous coal reserves.
[16] ARIZONA, CALIFORNIA, Idaho, Nebraska, and Nevada.
[17] ARIZONA, CALIFORNIA, and Idaho.
[18] CALIFORNIA, Idaho, Louisiana, and Nevada.
[19] Less than total recorded production of about 34.8 billion tons. See footnotes 5, 6, 9, 10, 13, and 14.

Source: Averitt, Paul. Coal Reserves of the United States—A Progress Report January 1, 1960. Geol. Survey Bull. 1136, 1961, pp. 10–11.

Table 3.—Number and production of bituminous coal and lignite mines in the United States 1960 classified by thickness of seams mined

Item	Less than 2 feet	2 to 3 feet	3 to 4 feet	4 to 5 feet	5 to 6 feet	6 to 7 feet	7 to 8 feet	8 feet and over	Total
Number of mines:									
Underground	35	1,811	2,178	990	449	266	132	128	5,989
Strip	140	510	418	222	106	52	22	60	1,530
Auger	3	71	129	94	40	8	---	1	346
Total	178	2,392	2,725	1,306	595	326	154	189	7,865
Percentage of mines:									
Underground	0.6	30.2	36.4	16.5	7.5	4.5	2.2	2.1	100.0
Strip	9.2	33.3	27.3	14.5	6.9	3.4	1.5	3.9	100.0
Auger	.9	20.4	37.3	27.2	11.6	2.3	---	.3	100.0
Total	2.3	30.4	34.6	16.6	7.6	4.1	2.0	2.4	100.0
Production (thousand tons):									
Underground	231	20,851	65,322	49,633	53,928	39,833	29,665	25,425	284,888
Strip	5,660	19,503	32,934	30,456	17,692	7,126	3,546	5,713	122,630
Auger	44	939	2,781	2,965	971	235	---	59	7,994
Total	5,935	41,293	101,037	83,054	72,591	47,194	33,211	31,197	415,512
Percentage of production:									
Underground	0.1	7.3	22.9	17.4	19.0	14.0	10.4	8.9	100.0
Strip	4.6	15.9	26.9	24.8	14.4	5.8	2.9	4.7	100.0
Auger	.5	11.7	35.0	37.1	12.1	2.9	---	.7	100.0
Total	1.4	9.9	24.3	20.0	17.5	11.4	8.0	7.5	100.0

NUMBER AND SIZE OF MINES

The unit in the statistical record is the mine, and operating companies are requested to make a separate report for each mine because its location is definitely known and can be related to a specific district or county; its identity can be followed through successive changes of ownership; and it is the natural operating unit from the standpoint of cost, mechanical equipment, mining practice, and output per man per day. See figure 5.

EMPLOYMENT AND PRODUCTIVITY

The bituminous coal and lignite industry has become highly mechanized in recent years. Mechanization has strongly affected production per man per day and the number of employees. In the past 20 years productivity has increased 203 percent and the number of employees has declined 65 percent. See figure 6.

UNDERGROUND MINING

Two-thirds of the output of bituminous coal and lignite is mined underground. For conventional mining, the major tasks underground are cutting, drilling, shooting, loading, roofbolting, and haulage; whereas in continuous mining the major tasks are boring or ripping the coal from the face, roofbolting, and haulage. Loading is discussed later in the section on mechanical loading. For many years, most of the underground production has been cut by machine; however, as the percentage of production by continuous-mining machines increases, the percentage cut by machines will decrease. The use of power drills for shotholes increased rapidly from less than 50 percent of the underground production in 1940 to a maximum of 84 percent in 1953. The use of continuous-mining machines decreased the tonnage power drilled for shotholes to 57 percent of the underground output. Trolley locomotives are the principal method of underground haulage; however, in recent years the use of conveyor haulage has increased steadily.

Mines producing 57 percent of the underground output reported 86,957 rail mine cars and 3,665 miles of rail track, while mines producing 7 percent used rubber-tired mine cars. Mines not reporting type of haulage produced 8 percent, and mines employing 100 percent conveyor haulage furnished 27 percent of the underground production, and shuttle buggies furnished 2 percent.

Table 4.—Overburden at bituminous coal and lignite strip mines in the United States, by States

State	Number of strip mines				Mined by stripping (thousand net tons)				Overburden excavated: Cubic yards per net ton of coal mined				Overburden excavated: Average thickness (feet)				Coal seam mined—average thickness (feet)			
	1946	1950	1955	1960	1946	1950	1955	1960	1946	1950	1955	1960	1946	1950	1955	1960	1946	1950	1955	1960
Alabama	43	46	39	39	1,815	1,888	2,111	2,559	8.5	9.0	17.0	15.5	24.7	25.0	47.4	42.0	3.9	3.3	3.2	2.8
Alaska	2	5	7	6	87	131	400	656	NA	NA	4.6	3.1	NA	60.7	94.3	74.6	NA	13.2	23.7	34.6
Arkansas	20	15	8	10	563	505	261	296	9.5	16.1	21.5	21.7	27.2	22.8	32.4	32.2	4.2	5.7	1.7	1.8
Colorado	4	8	7	7	155	407	357	693	4.4	6.7	6.0	(1)	40.0	27.0	40.0	37.7	10.0	8.3	6.2	8.4
Georgia	1	---	---	---	89	---	---	---	NA	---	---	---	NA	---	---	---	(1)	---	---	---
Illinois	46	81	68	69	15,162	17,613	18,675	22,670	12.4	13.4	12.8	13.2	43.2	47.1	48.7	51.9	4.5	5.0	4.8	5.0
Indiana	50	44	56	47	11,826	10,740	11,182	10,785	10.1	11.5	14.5	13.4	37.2	40.0	43.2	46.0	4.2	4.4	4.4	4.6
Iowa	23	37	30	25	631	1,190	961	868	10.9	9.1	10.7	14.2	37.6	26.3	36.9	41.0	4.1	4.9	3.9	4.5
Kansas	30	32	19	11	2,283	2,024	727	885	23.4	19.4	24.6	25.1	33.6	30.7	28.7	29.1	1.6	1.9	1.6	1.5
Kentucky:																				
Eastern	24	72	72	68	1,444	2,511	1,902	1,983	8.2	8.8	NA	8.0	27.8	38.8	29.3	38.1	3.6	5.6	3.3	3.1
Western	32	64	46	61	5,910	11,467	11,741	17,689	5.3	5.3	6.9	8.2	28.8	38.2	37.6	46.1	5.9	5.2	5.0	5.1
Total Kentucky	56	136	118	129	7,354	13,978	13,643	19,672	5.5	5.3	NA	8.2	28.7	38.2	37.3	45.7	5.4	5.3	4.8	4.9
Maryland	23	22	26	37	558	161	237	488	3.5	(1)	---	10.7	28.7	27.4	30.0	41.6	8.3	4.7	4.7	4.3
Missouri	29	43	28	23	3,341	2,635	3,075	2,802	15.1	17.1	19.8	17.4	30.3	32.5	33.6	31.7	2.5	3.3	2.5	2.2
Montana (bituminous and lignite)	2	2	5	5	2,454	1,717	808	197	2.2	2.8	1.2	6.0	49.2	63.8	32.0	34.8	25.0	22.9	23.5	16.6
New Mexico	---	---	3	1	---	---	27	45	---	---	4.0	NA	---	---	23.0	8.0	---	---	6.3	3.0
North Dakota (lignite)	28	37	40	31	2,128	2,828	3,081	2,523	5.2	5.6	4.7	4.9	47.5	38.2	43.3	41.3	10.3	9.4	12.1	11.0
Ohio	197	303	259	265	14,207	22,775	23,959	23,883	8.4	10.9	14.6	14.8	25.8	36.7	41.3	46.1	3.7	3.8	3.8	3.7
Oklahoma	22	29	21	15	1,672	1,727	1,469	1,094	14.9	19.3	22.9	21.9	29.0	31.7	32.4	32.2	2.0	2.1	2.3	1.7
Pennsylvania	640	726	585	553	31,687	26,427	20,518	20,876	8.7	9.6	14.1	14.5	25.3	33.3	40.9	43.5	4.1	3.7	3.2	3.2
Tennessee	7	16	87	71	196	584	1,635	1,764	10.4	16.1	11.4	19.0	21.4	27.1	24.4	30.1	2.4	2.9	2.5	2.9
Texas (lignite)	1	1	---	---	56	18	---	---	2.8	3.1	---	---	30.0	25.0	---	---	12.0	12.0	---	---
Virginia	15	19	31	35	656	1,566	982	1,371	4.8	6.3	6.9	12.2	28.2	50.1	38.4	39.7	7.8	6.1	5.0	4.1
Washington	8	4	1	1	97	71	32	16	6.9	2.8	5.0	10.5	23.3	23.6	25.0	25.0	7.1	7.0	5.5	2.9
West Virginia	186	249	168	140	14,937	12,986	9,380	6,754	6.4	6.5	8.9	11.8	30.9	38.5	37.0	42.5	6.1	5.5	5.8	4.9
Wyoming	9	12	8	9	993	1,459	1,539	1,713	2.1	2.1	1.6	.7	46.3	38.2	29.3	46.2	28.1	38.3	33.1	45.9
Other States: California and South Dakota (lignite)	3	3	3	[1] 1	17	37	34	[1] 20	8.5	10.8	6.5	[2] 13.9	33.1	33.4	33.2	NA	4.4	4.4	5.3	[2] 4.5
Total	1,445	1,870	1,617	1,530	112,964	123,467	115,093	122,630	9.1	10.7	12.3	12.6	31.6	39.0	41.6	45.6	5.2	5.1	4.9	5.1

NA Not available.
[1] South Dakota only.

Table 5.—Number of mines, production, output per man per day, and average thickness of seams mined, at underground, strip, and auger bituminous coal and lignite mines in the United States, 1960, by States

State	Underground mines				Strip mines				Auger mines				Total, all mines			
	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)
Alabama	135	10,365,340	7.80	4.1	39	2,558,414	14.96	2.8	3	86,893	26.32	2.7	177	13,010,647	8.66	3.8
Alaska	2	66,982	6.01	20.9	6	655,489	15.43	34.6	---	-------	---	---	8	722,471	13.47	34.3
Arizona	2	5,526	2.02	5.5	---	-------	---	---	---	-------	---	---	2	5,526	2.02	5.5
Arkansas	10	112,774	4.24	2.6	10	296,425	13.38	1.8	---	-------	---	---	20	409,199	8.39	2.0
Colorado	87	2,914,437	8.06	7.6	7	692,849	28.46	8.4	---	-------	---	---	94	3,607,286	9.34	7.8
Georgia	2	4,215	1.84	1.5	---	-------	---	---	---	-------	---	---	2	4,215	1.84	1.5
Illinois	59	23,306,901	17.38	7.5	69	22,670,585	30.04	5.0	---	-------	---	---	128	45,977,486	21.94	6.3
Indiana	34	4,752,902	11.96	5.8	47	10,784,967	29.50	4.6	---	-------	---	---	81	15,537,869	20.36	5.0
Iowa	19	200,100	4.51	4.9	25	867,924	18.15	4.5	---	-------	---	---	44	1,068,024	11.58	4.6
Kansas	2	3,584	2.41	2.1	11	884,690	17.11	1.5	---	-------	---	---	13	888,274	16.70	1.5
Kentucky	1,630	44,468,474	10.61	4.3	129	19,672,192	36.16	4.9	105	2,705,826	30.30	4.1	1,864	66,846,492	13.86	4.5
Maryland	48	260,198	4.37	3.2	37	487,636	15.51	4.3	---	-------	---	---	85	747,834	8.22	3.9
Missouri	10	88,273	3.06	3.6	23	2,801,937	11.83	2.2	---	-------	---	---	33	2,890,210	10.88	2.2
Montana (bituminous and lignite)	14	115,993	6.17	6.6	5	197,430	37.34	16.6	---	-------	---	---	19	313,423	13.01	12.9
New Mexico	18	249,762	6.32	6.3	1	45,000	45.00	3.0	---	-------	---	---	19	294,762	7.27	5.8
North Dakota (lignite)	1	2,403	7.30	9.0	31	2,522,552	37.07	11.0	---	-------	---	---	32	2,524,955	36.93	11.0
Ohio	149	9,206,400	10.95	4.9	265	23,883,289	23.59	3.7	56	867,083	42.45	3.8	470	33,956,772	18.13	4.0
Oklahoma	11	247,568	3.10	3.4	15	1,093,965	16.34	1.7	---	-------	---	---	26	1,341,533	9.14	2.0
Pennsylvania	680	44,070,560	9.04	5.5	553	20,875,533	17.03	3.2	49	479,172	18.53	3.6	1,282	65,425,265	10.68	4.8
South Dakota (lignite)	---	-------	---	---	1	20,448	10.10	4.5	---	-------	---	---	1	20,448	10.10	4.5
Tennessee	332	3,938,626	6.70	4.2	71	1,763,913	20.97	2.9	12	227,911	25.93	3.7	415	5,930,450	8.71	3.8
Utah	45	[4] 4,954,693	10.71	10.8	---	-------	---	---	---	-------	---	---	45	4,954,693	10.71	10.8
Virginia	1,201	25,819,830	9.44	5.6	35	1,370,864	26.77	4.1	32	647,201	33.04	3.5	1,268	27,837,895	9.92	5.5
Washington	9	211,968	6.30	7.8	1	16,177	9.77	2.9	---	-------	---	---	10	228,145	6.46	7.5
West Virginia	1,479	109,209,989	11.78	5.1	140	6,754,001	13.65	4.9	89	2,980,287	34.30	4.6	1,708	118,944,277	12.07	5.1
Wyoming	10	310,812	7.60	7.5	9	1,713,384	39.20	45.9	---	-------	---	---	19	2,024,196	23.93	40.0
Total	5,989	284,888,310	10.64	5.4	1,530	122,629,664	22.93	5.1	346	7,994,373	31.36	4.2	7,865	415,512,347	12.83	5.3

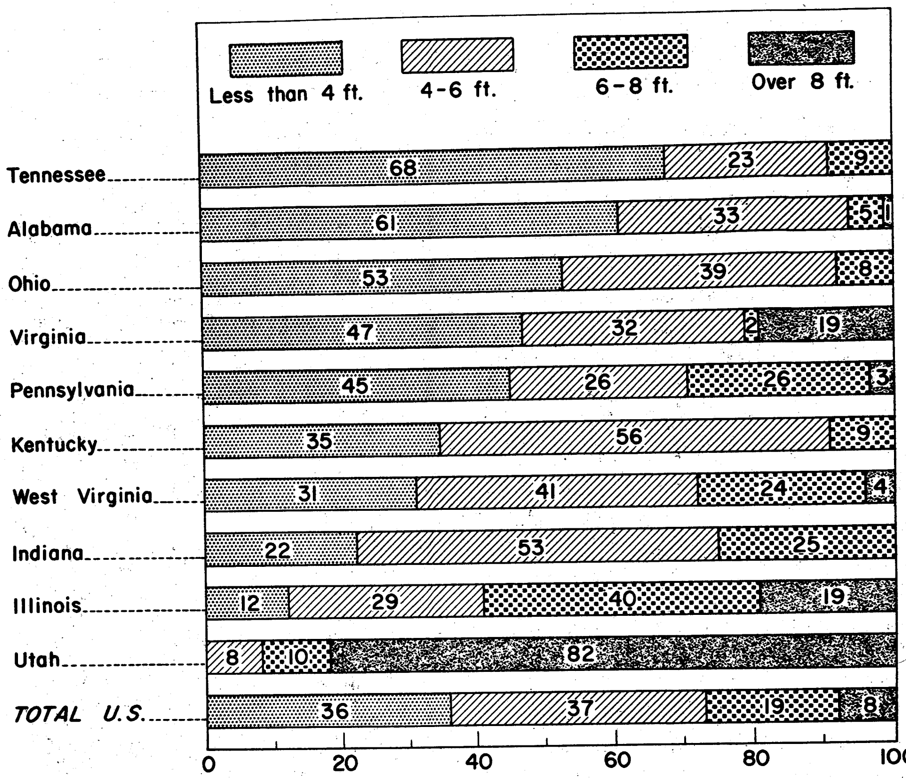

Figure 1.—Percentage of bituminous coal and lignite produced in the 10 leading coal-producing States and total United States, 1960, by thickness of seams mined.

Table 6.—Growth of the bituminous coal and lignite mining industry in the United States

Year	Production (net tons)	Value of production		Number of mines	Capacity at 280 days (million tons)	Foreign trade [1]	
		Total	Average per ton			Exports (net tons)	Imports (net tons)
1890	111,302,322	$110,420,801	$.99	NA	137	1,272,396	1,047,416
1895	135,118,193	115,779,771	.86	2,555	196	2,659,987	1,411,323
1900	212,316,112	220,930,313	1.04	NA	255	6,060,688	1,911,925
1905	315,062,785	334,658,294	1.06	5,060	417	7,512,723	1,704,810
1910	417,111,142	469,281,719	1.12	5,818	538	11,663,052	1,819,766
1915	442,624,426	502,037,688	1.13	5,502	610	18,776,640	1,703,785
1916	502,519,682	665,116,077	1.32	5,726	613	21,254,627	1,713,837
1917	551,790,563	1,249,272,837	2.26	6,939	636	23,839,558	1,448,453
1918	579,385,820	1,491,809,940	2.58	8,319	650	22,350,730	1,457,073
1919	465,860,058	1,160,616,013	2.49	8,994	669	20,113,536	1,011,550
1920	568,666,683	2,129,933,000	3.75	8,921	725	38,517,084	1,244,990
1921	415,921,950	1,199,983,600	2.89	8,038	781	23,131,166	1,257,589
1922	422,268,099	1,274,820,000	3.02	9,299	832	12,413,085	5,059,999
1923	564,564,662	1,514,621,000	2.68	9,331	885	21,453,579	1,882,306
1924	483,686,538	1,062,626,000	2.20	7,586	792	17,100,347	417,226
1925	520,052,741	1,060,402,000	2.04	7,144	748	17,461,560	601,737
1926	573,366,985	1,183,412,000	2.06	7,177	747	35,271,937	485,666
1927	517,763,352	1,029,657,000	1.99	7,011	759	18,011,744	549,843
1928	500,744,970	933,774,000	1.86	6,450	691	16,164,485	546,526
1929	534,988,593	952,781,000	1.78	6,057	679	17,429,298	495,219
1930	467,526,299	795,483,000	1.70	5,891	700	15,877,407	240,886
1931	382,089,396	588,895,000	1.54	5,642	669	12,126,299	206,303
1932	309,709,872	406,677,000	1.31	5,427	594	8,814,047	186,909
1933	333,630,533	445,788,000	1.34	5,555	559	9,036,947	197,429
1934	359,368,022	628,383,000	1.75	6,258	565	10,868,552	179,661
1935	372,373,122	658,063,000	1.77	6,315	582	9,742,430	201,871
1936	439,087,903	770,955,000	1.76	6,875	618	10,654,959	271,798
1937	445,531,449	864,042,000	1.94	6,548	646	13,144,678	257,996
1938	348,544,764	678,653,000	1.95	5,777	602	10,490,269	241,305
1939	394,855,325	728,348,366	1.84	5,820	621	11,590,478	355,115
1940	460,771,500	879,327,227	1.91	6,324	639	16,465,928	371,571
1941	514,149,245	1,125,362,836	2.19	6,822	666	20,740,471	390,049
1942	582,692,937	1,373,990,608	2.36	6,972	663	22,943,305	498,103
1943	590,177,069	1,584,644,477	2.69	6,620	626	25,836,208	757,634
1944	619,576,240	1,810,900,542	2.92	6,928	624	26,032,348	633,689
1945	577,617,327	1,768,204,320	3.06	7,033	620	27,956,192	467,473
1946	533,922,068	1,835,539,476	3.44	7,333	699	41,197,378	434,680
1947	630,623,722	2,622,634,946	4.16	8,700	755	68,666,963	290,141
1948	599,518,229	2,993,267,021	4.99	9,079	774	45,930,133	291,337
1949	437,868,036	2,136,870,571	4.88	8,559	781	27,842,056	314,980
1950	516,311,053	2,500,373,779	4.84	9,429	790	25,468,403	346,706
1951	533,664,732	2,626,030,137	4.92	8,009	736	56,721,547	292,378
1952	466,840,782	2,289,180,401	4.90	7,275	703	47,643,150	262,268
1953	457,290,449	2,247,943,799	4.92	6,671	670	33,760,263	226,900
1954	391,706,300	1,769,619,723	4.52	6,130	603	31,040,564	198,799
1955	464,633,408	2,092,382,737	4.50	7,856	620	51,277,256	337,145
1956	500,874,077	2,412,004,151	4.82	8,520	655	68,552,629	355,701
1957	492,703,916	2,504,406,042	5.08	8,539	680	76,445,529	366,506
1958	410,445,547	1,996,281,274	4.86	8,264	625	50,293,382	306,940
1959	412,027,502	1,965,606,901	4.77	7,719	614	37,253,431	374,713
1960	415,512,347	1,950,425,049	4.69	7,865	609	36,541,075	260,495
1961	402,976,802	1,844,562,662	4.58	7,648	585	34,969,825	164,259
1962	422,149,325	1,891,554,474	4.48	7,740	594	38,413,424	232,424
1963	458,928,175	2,013,309,368	4.39	7,940	627	47,078,435	267,352
1964	486,997,952	2,165,581,847	4.45	7,630	606	47,969,423	293,059
1965	512,088,263	2,276,022,033	4.44	7,228	655	50,181,361	184,399

See footnotes at end of table.

Table 6.—Growth of the bituminous coal and lignite mining industry in the United States—Continued

Year	Men employed	Average number of days worked	Average days lost per man on strike	Net tons per man—		Percentage of underground production—		Percentage of total production—	
				Per day	Per year	Cut by machines [3]	Mechanically loaded	Mechanically cleaned [4]	Mined by stripping
1890	192,204	226	NA	2.56	579	NA	NA	NA	NA
1895	239,962	194	NA	2.90	563	NA	NA	NA	NA
1900	304,375	234	43	2.98	697	24.9	NA	NA	NA
1905	460,629	211	23	3.24	684	32.8	NA	NA	NA
1910	555,533	217	89	3.46	751	41.7	NA	3.8	NA
1915	557,456	203	61	3.91	794	55.3	NA	4.7	0.6
1920	639,547	220	22	4.00	881	60.7	NA	3.3	1.5
1921	663,754	149	23	4.20	627	66.4	NA	3.4	1.2
1922	687,958	142	117	4.28	609	64.8	NA	NA	2.4
1923	704,793	179	20	4.47	801	68.3	0.3	3.8	2.1
1924	619,604	171	73	4.56	781	71.5	.7	NA	2.8
1925	588,493	195	30	4.52	884	72.9	1.2	NA	3.2
1926	593,647	215	24	4.50	966	73.8	1.9	NA	3.0
1927	593,918	191	153	4.55	872	74.9	3.3	5.3	3.6
1928	522,150	203	83	4.73	959	76.9	4.5	5.7	4.0
1929	502,993	219	11	4.85	1,064	78.4	7.4	6.9	3.8
1930	493,202	187	43	5.06	948	81.0	10.5	8.3	4.3
1931	450,213	160	35	5.30	849	83.2	13.1	9.5	5.0
1932	406,380	146	120	5.22	762	84.1	12.3	9.8	6.3
1933	418,703	167	30	4.78	797	84.7	12.0	10.4	5.5
1934	458,011	178	15	4.40	785	84.1	12.2	11.1	5.8
1935	462,403	179	[3] 7	4.50	805	84.2	13.5	12.2	6.4
1936	477,204	199	21	4.62	920	84.8	16.3	13.9	6.4
1937	491,864	193	[4] 19	4.69	906	NA	20.2	14.6	7.1
1938	441,333	162	13	4.89	790	87.5	26.7	18.2	8.7
1939	421,788	178	36	5.25	936	87.9	31.0	20.1	9.6
1940	439,075	202	8	5.19	1,049	88.4	35.4	22.2	9.2
1941	456,981	216	27	5.20	1,125	89.0	40.7	22.9	10.7
1942	461,991	246	7	5.12	1,261	89.7	45.2	24.4	11.5
1943	416,007	264	[4] 15	5.38	1,419	90.3	48.9	24.7	13.5
1944	393,347	278	[4] 5	5.67	1,575	90.5	52.9	25.6	16.3
1945	383,100	261	[4] 9	5.78	1,508	90.8	56.1	25.6	19.0
1946	[5] 396,434	214	[4] 23	6.30	1,347	90.8	58.4	26.0	21.1
1947	[5] 419,182	234	[4] 5	6.42	1,504	90.0	60.7	27.7	22.1
1948	[5] 441,631	217	[4] 16	6.26	1,358	90.7	64.3	30.2	23.3
1949	[5] 433,698	157	[4] 15	6.43	1,010	91.4	67.0	35.1	24.2
1950	[5] 415,582	183	[4] 56	6.77	1,239	91.8	69.4	38.5	23.9
1951	[5] 372,897	203	[4] 4	7.04	1,429	93.4	73.1	45.0	22.0
1952	[5] 335,217	186	[4] 6	7.47	1,389	92.8	75.6	48.7	23.3
1953	[5] 293,106	191	[4] 3	8.17	1,560	92.3	79.6	52.9	23.1
1954	[5] 227,397	182	[4] 4	9.47	1,724	88.8	84.0	59.4	25.1
1955	[5] 225,093	210	[4] 4	9.84	2,064	88.1	84.6	58.7	24.8
1956	[5] 228,163	214	[4] 4	10.28	2,195	84.6	84.0	58.4	25.4
1957	[5] 228,635	203	[4] 3	10.59	2,155	80.9	84.8	61.7	25.2
1958	[5] 197,402	184	[4] 3	11.33	2,079	75.3	84.9	63.1	28.3
1959	[5] 179,636	188	[4] 24	12.22	2,294	72.1	86.0	65.5	29.4
1960	[5] 169,400	191	[4] 4	12.83	2,453	67.8	86.3	65.7	29.5
1961	[5] 150,474	193	[4] 4	13.87	2,678	64.7	86.3	65.7	30.3
1962	[5] 143,822	199	[4] 6	14.72	2,935	63.3	85.7	64.3	30.9
1963	[5] 141,646	205	[4] 6	15.83	3,240	61.0	85.8	63.1	31.4
1964	[5] 128,698	225	[4] 6	16.84	3,784	57.4	87.4	63.7	31.2
1965	[5] 133,732	219	[4] 4	17.52	3,829	53.9	89.2	64.9	32.3

NA Not available.
[1] Figures for 1890–1914 represent fiscal year ended June 30.
[2] Percentages for 1890–1913 are of total production, as a separation of underground and strip production is not available for these years. Exclusive of continuous mining which began in 1948.
[3] Percentages for 1906–26 are exclusive of coal cleaned at central washeries operated by consumers.
[4] Bureau of Labor Statistics, U.S. Department of Labor.
[5] Average number of men working daily.

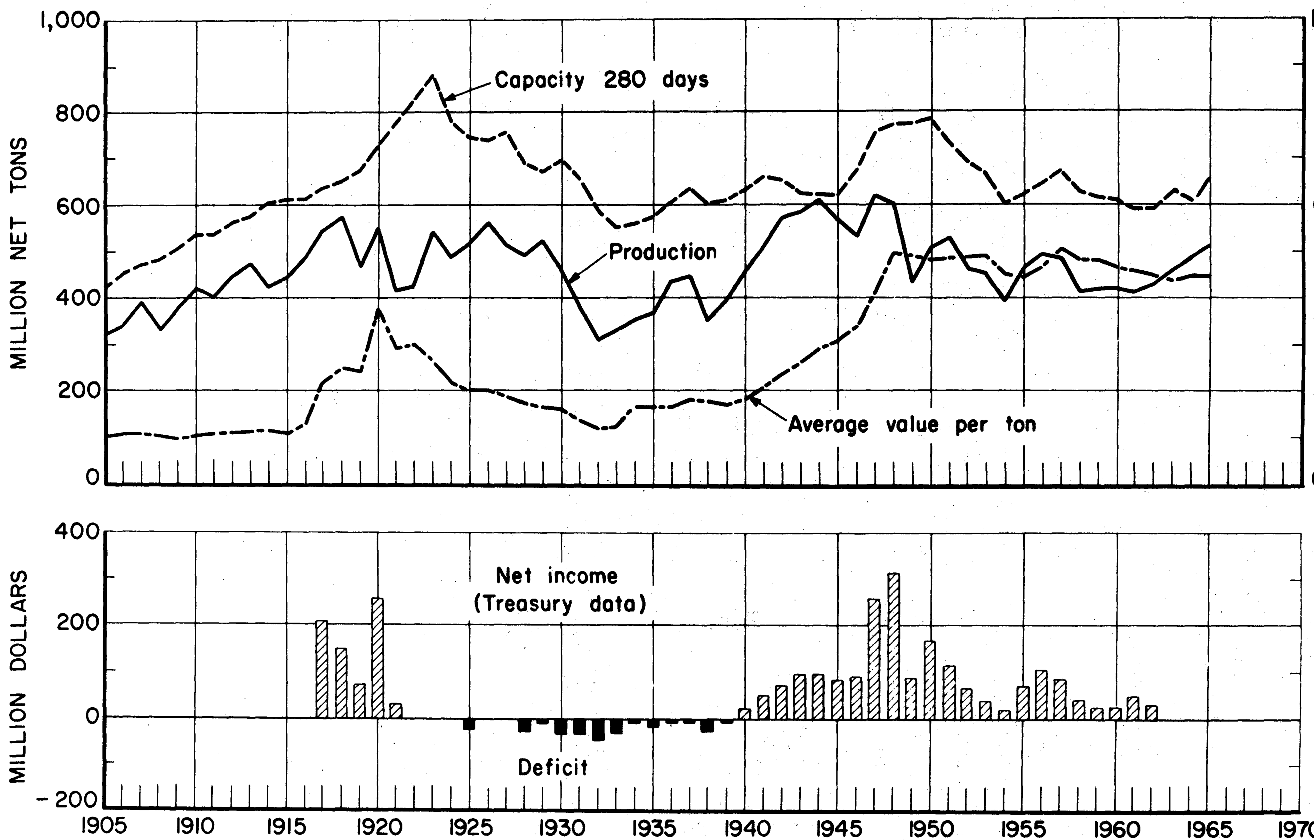

Figure 2.—Trends of bituminous coal and lignite production, realization, mine capacity, and net income or deficit in the United States.

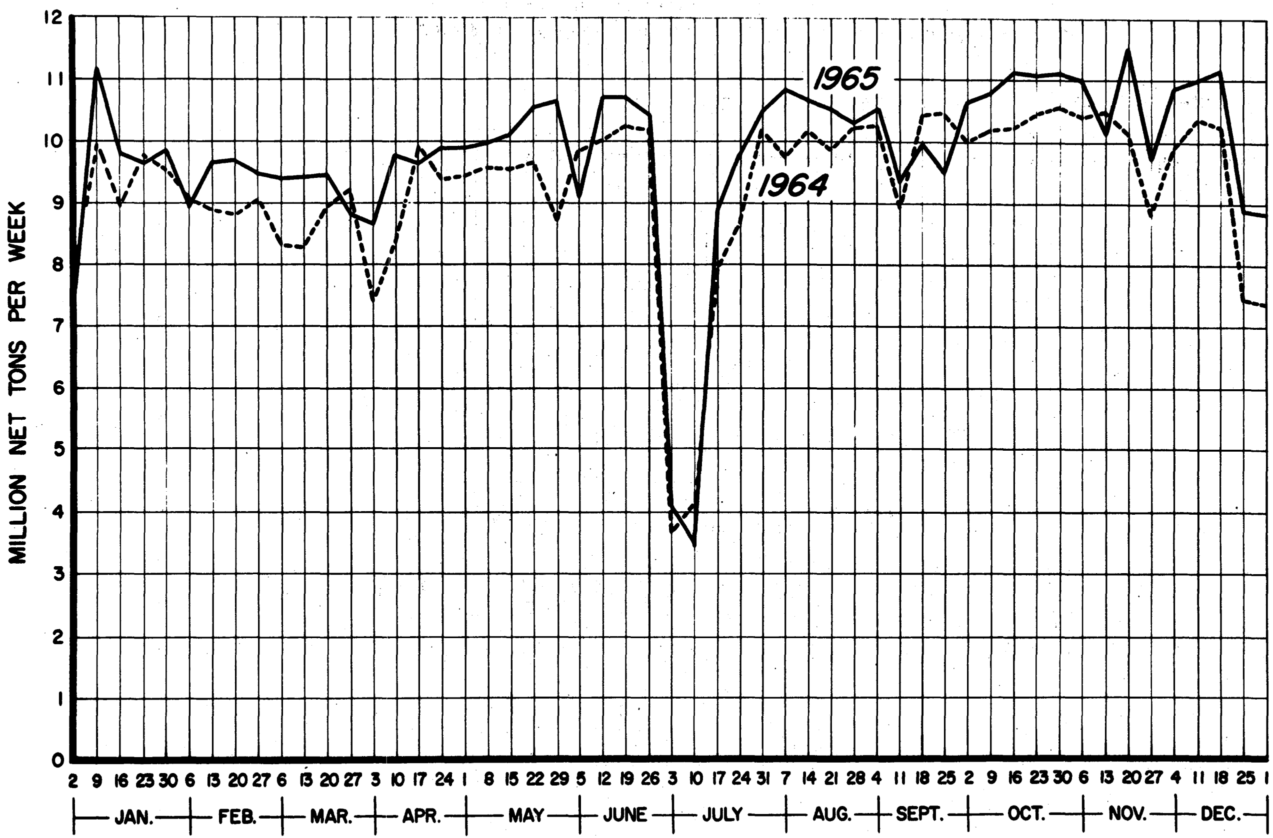

Figure 3.—Production of bituminous coal and lignite in the United States, 1964–65, by weeks.

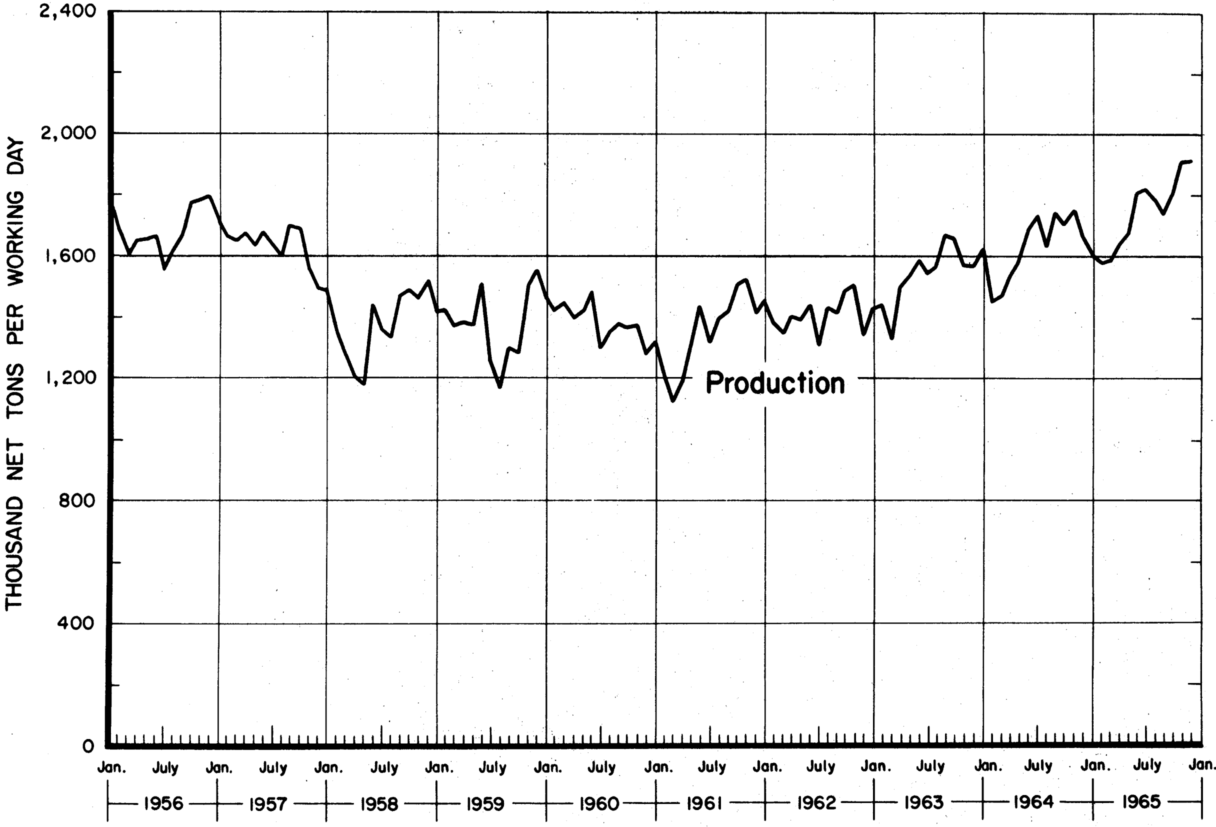

Figure 4.—Average production of bituminous coal and lignite in the United States, per working day in each month, 1956–65.

Table 7.—Production of bituminous coal and lignite in the United States, 1965, by States, with estimates by months

(Thousand net tons)

State	January	Feb-ruary	March	April	May	June	July	August	Septem-ber	October	Novem-ber	Decem-ber	Total: Net tons	Total: Percent-age
Alabama	1,285	1,130	1,415	1,260	1,319	1,264	845	1,335	1,192	1,216	1,273	1,298	14,832	2.90
Alaska	81	74	81	74	64	79	54	56	66	86	88	90	893	.18
Arkansas	18	20	20	20	15	17	17	18	20	20	23	18	226	.04
Colorado	414	475	481	350	340	309	225	340	405	448	473	530	4,790	.93
Georgia	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Illinois	4,686	4,498	5,433	4,727	4,706	4,878	3,660	4,932	5,002	5,249	5,228	5,484	58,483	11.42
Indiana	1,335	1,210	1,437	1,119	1,069	1,226	828	1,356	1,284	1,406	1,551	1,744	15,565	3.04
Iowa	123	100	103	73	80	70	73	94	57	94	94	82	1,043	.20
Kansas	72	87	95	80	93	102	80	145	124	127	165	140	1,310	.25
Kentucky:														
Eastern	3,439	3,137	3,639	3,891	3,606	3,921	3,491	4,295	4,327	4,287	4,249	4,285	46,567	9.09
Western	3,125	2,922	2,513	3,182	3,349	3,262	2,480	3,563	3,443	3,749	3,879	3,732	39,199	7.66
Total Kentucky	6,564	6,059	6,152	7,073	6,955	7,183	5,971	7,858	7,770	8,036	8,128	8,017	85,766	16.75
Maryland	101	114	134	88	92	95	86	97	114	106	85	98	1,210	.24
Missouri	288	258	268	269	234	303	208	332	337	322	355	390	3,564	.70
Montana:														
Bituminous	6	5	5	6	3	5	5	3	5	7	7	6	63	.01
Lignite	27	24	26	31	16	22	22	12	26	32	31	32	301	.06
Total Montana	33	29	31	37	19	27	27	15	31	39	38	38	364	.07
New Mexico	275	259	304	303	301	217	231	297	302	257	260	206	3,212	.63
North Dakota (lignite)	287	285	290	219	108	162	150	190	199	236	292	314	2,732	.54
Ohio	2,584	2,603	2,890	3,094	3,395	3,724	3,183	3,623	3,109	4,020	3,927	3,238	39,390	7.69
Oklahoma	108	85	73	76	74	83	82	82	83	70	80	78	974	.19
Pennsylvania	6,671	6,343	7,006	6,575	6,774	6,702	5,507	7,078	6,267	7,244	6,902	7,239	80,308	15.68
South Dakota (lignite)	2	2	2	---	---	---	---	---	---	---	2	2	10	---
Tennessee	464	443	499	491	423	477	420	523	500	521	528	576	5,865	1.15
Utah	452	423	460	387	350	376	278	406	461	451	453	495	4,992	.97
Virginia	2,552	2,382	2,897	2,761	2,798	2,859	2,542	3,173	2,983	3,062	2,984	3,060	34,053	6.65
Washington	10	8	6	4	3	3	2	2	2	2	4	9	55	.01
West Virginia	11,219	10,693	12,475	12,589	12,684	12,911	9,596	14,279	12,943	13,395	13,207	13,200	149,191	29.13
Wyoming	391	282	264	193	158	170	147	178	274	372	402	429	3,260	.64
Total	40,015	37,862	42,816	41,862	42,054	43,237	34,212	46,409	43,525	46,779	46,542	46,775	512,088	100.00

Table 8.—Estimated monthly production of bituminous coal and lignite, 1965, by districts, in thousand net tons [1]

(Districts as defined in the Coal Act of 1937 and modifications thereto)

District	January	February	March	April	May	June	July	August	September	October	November	December	Total: Net tons	Total: Percentage
1. Eastern Pennsylvania	3,447	3,295	3,660	3,408	3,507	3,480	2,854	3,679	3,284	3,756	3,568	3,741	41,679	8.14
2. Western Pennsylvania	3,499	3,327	3,675	3,449	3,553	3,515	2,889	3,713	3,287	3,800	3,620	3,797	42,124	8.23
3. Northern West Virginia	3,648	3,474	4,107	4,084	4,063	4,152	3,146	4,563	3,983	4,328	4,231	4,227	48,006	9.37
4. Ohio	2,584	2,603	2,890	3,094	3,395	3,724	3,183	3,623	3,109	4,020	3,927	3,238	39,390	7.69
5. Michigan	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6. Panhandle	385	367	434	431	429	438	332	482	420	457	447	446	5,068	.99
7. Southern Numbered 1	2,940	2,799	3,250	3,294	3,343	3,397	2,532	3,771	3,495	3,525	3,488	3,493	39,327	7.68
8. Southern Numbered 2	10,426	9,753	11,415	11,622	11,390	11,879	9,797	13,123	12,556	12,635	12,486	12,628	139,710	27.28
9. West Kentucky	3,125	2,922	2,513	3,182	3,349	3,262	2,480	3,563	3,443	3,749	3,879	3,732	39,199	7.66
10. Illinois	4,686	4,498	5,433	4,727	4,706	4,878	3,660	4,932	5,002	5,249	5,228	5,484	58,483	11.42
11. Indiana	1,335	1,210	1,437	1,119	1,069	1,226	828	1,356	1,284	1,406	1,551	1,744	15,565	3.04
12. Iowa	123	100	103	73	80	70	73	94	57	94	94	82	1,043	.20
13. Southeastern	1,386	1,227	1,524	1,367	1,411	1,368	937	1,449	1,301	1,330	1,388	1,424	16,112	3.15
14. Arkansas-Oklahoma	68	59	54	55	49	55	55	56	58	52	60	54	675	.13
15. Southwestern	418	391	402	390	367	450	332	521	506	487	563	572	5,399	1.05
16. Northern Colorado	86	79	71	51	47	39	3	37	52	68	81	90	704	.14
17. Southern Colorado	364	430	451	340	333	299	253	343	393	414	426	467	4,513	.88
18. New Mexico	239	225	263	262	261	188	200	257	262	223	226	179	2,785	.54
19. Wyoming	391	282	264	193	158	170	147	178	274	372	402	429	3,260	.64
20. Utah	452	423	460	387	350	376	278	406	461	451	453	495	4,992	.97
21. North-South Dakota	289	287	292	219	108	162	150	190	199	236	294	316	2,742	.54
22. Montana	33	29	31	37	19	27	27	15	31	39	38	38	364	.07
23. Washington	91	82	87	78	67	82	56	58	68	88	92	99	948	.19
Total	40,015	37,862	42,816	41,862	42,054	43,237	34,212	46,409	43,525	46,779	46,542	46,775	512,088	100.00

[1] Figures are based principally upon railroad carloadings and shipments on the Allegheny and Monongahela Rivers, supplemented by direct reports from certain local sources. Allowance is made for all mines producing 1,000 tons or over per year.

Table 9.—Production of bituminous coal and lignite in the United States, with estimates by weeks

1964				1965			
Week ended—	Production (thousand net tons)	Maximum number of working days	Average production per working day (thousand net tons)	Week ended—	Production (thousand net tons)	Maximum number of working days	Average production per working day (thousand net tons)
Jan. 4	[1] 4,260	[1] 3	[2] 1,570	Jan. 2	[1] 495	[1] 1	[2] 1,570
Jan. 11	9,942	6	1,657	Jan. 9	10,177	6	1,696
Jan. 18	8,956	6	1,493	Jan. 16	9,831	6	1,639
Jan. 25	9,771	6	1,629	Jan. 23	9,644	6	1,607
Feb. 1	9,550	6	1,592	Jan. 30	9,868	6	1,645
Feb. 8	9,073	6	1,512	Feb. 6	8,966	6	1,494
Feb. 15	8,918	6	1,486	Feb. 13	9,667	6	1,611
Feb. 22	8,821	6	1,470	Feb. 20	9,731	6	1,622
Feb. 29	9,014	6	1,502	Feb. 27	9,498	6	1,583
Mar. 7	8,328	6	1,388	Mar. 6	9,413	6	1,569
Mar. 14	8,307	6	1,385	Mar. 13	9,435	6	1,573
Mar. 21	8,950	6	1,492	Mar. 20	9,473	6	1,579
Mar. 28	9,199	6	1,533	Mar. 27	8,864	6	1,477
Apr. 4	7,412	5.4	1,373	Apr. 3	8,678	5.5	1,578
Apr. 11	8,390	6	1,398	Apr. 10	9,792	6	1,632
Apr. 18	9,944	6	1,657	Apr. 17	9,641	6	1,607
Apr. 25	9,389	6	1,565	Apr. 24	9,919	6	1,653
May 2	9,461	6	1,577	May 1	9,918	6	1,653
May 9	9,588	6	1,598	May 8	9,992	6	1,665
May 16	9,551	6	1,592	May 15	10,115	6	1,686
May 23	9,667	6	1,611	May 22	10,561	6	1,760
May 30	8,766	5	1,753	May 29	10,651	6	1,775
June 6	9,847	6	1,641	June 5	9,113	5.1	1,787
June 13	10,009	6	1,668	June 12	10,727	6	1,788
June 20	10,247	6	1,708	June 19	10,738	6	1,790
June 27	10,174	5.9	1,724	June 26	10,455	5.7	1,834
July 4	3,658	1.9	1,925	July 3	4,084	2.0	2,042
July 11	4,108	2.2	1,867	July 10	3,457	1.8	1,921
July 18	7,957	4.4	1,808	July 17	8,873	4.6	1,929
July 25	8,689	6	1,448	July 24	9,785	5.6	1,747
Aug. 1	10,155	6	1,693	July 31	10,497	6	1,750
Aug. 8	9,766	6	1,628	Aug. 7	10,875	6	1,813
Aug. 15	10,178	6	1,696	Aug. 14	10,690	6	1,782
Aug. 22	9,882	6	1,647	Aug. 21	10,545	6	1,758
Aug. 29	10,238	6	1,706	Aug. 28	10,331	6	1,722
Sept. 5	10,269	6	1,712	Sept. 4	10,554	6	1,759
Sept. 12	8,927	5	1,785	Sept. 11	9,349	5	1,870
Sept. 19	10,445	6	1,741	Sept. 18	9,999	6	1,667
Sept. 26	10,468	6	1,745	Sept. 25	9,502	6	1,584
Oct. 3	10,013	6	1,669	Oct. 2	10,675	6	1,779
Oct. 10	10,183	6	1,697	Oct. 9	10,808	6	1,801
Oct. 17	10,248	6	1,708	Oct. 16	11,150	6	1,858
Oct. 24	10,470	6	1,745	Oct. 23	11,101	6	1,850
Oct. 31	10,569	6	1,762	Oct. 30	11,134	6	1,856
Nov. 7	10,422	6	1,737	Nov. 6	11,021	6	1,837
Nov. 14	10,495	5.9	1,779	Nov. 13	10,165	5.4	1,882
Nov. 21	10,146	6	1,691	Nov. 20	11,525	6	1,921
Nov. 28	8,846	5	1,769	Nov. 27	9,769	5	1,954
Dec. 5	9,924	6	1,654	Dec. 4	10,882	6	1,814
Dec. 12	10,370	6	1,728	Dec. 11	11,005	6	1,834
Dec. 19	10,248	6	1,708	Dec. 18	11,174	6	1,862
Dec. 26	7,435	5	1,487	Dec. 25	8,915	4	2,229
Jan. 2	[1] 7,355	[1] 4	[2] 1,570	Jan. 1	[1] 8,861	[1] 4.5	[2] 1,946
Total	486,998	298.7	1,630	Total	512,088	295.2	1,735

[1] Figures represent output and number of working days in that part of week included in calendar year shown. Total production for the week ending January 4, 1964, was 7,850,000 net tons and for the week ending January 1, 1966, was 8,950,000 net tons.

[2] Average daily output for the entire week and not for working days in the calendar year shown.

Table 10.—Bituminous coal and lignite produced in the United States, by States, with production of maximum year and cumulative production from earliest record to end of 1965

(Thousand net tons)

State	Maximum production		Production, by years										Total production from earliest record to end of 1965
	Year	Quantity	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	
Alabama	1926	21,001	12,663	13,260	11,182	11,947	13,011	12,915	12,880	12,359	14,435	14,832	1,027,066
Arkansas	1907	2,670	590	508	364	441	409	395	256	221	212	226	99,977
Colorado	1917	12,483	3,502	3,594	2,974	3,294	3,607	3,678	3,379	3,690	4,355	4,790	530,012
Illinois	1918	89,291	48,102	46,993	43,912	45,466	45,977	45,246	48,487	51,736	55,023	58,483	3,910,902
Indiana	1918	30,679	17,089	15,841	15,022	14,804	15,538	15,106	15,709	15,100	15,075	15,565	1,241,256
Iowa	1917	8,966	1,358	1,312	1,179	1,180	1,068	927	1,130	1,218	973	1,043	357,861
Kansas	1918	7,562	884	749	823	772	888	664	915	1,169	1,263	1,310	285,432
Kentucky	1965	85,766	74,555	74,667	66,312	62,810	66,847	63,032	69,212	77,350	82,747	85,766	3,089,697
Maryland	1907	5,533	669	748	838	842	748	757	821	1,162	1,136	1,210	272,045
Missouri	1917	5,671	3,283	2,976	2,592	2,748	2,890	2,938	2,896	3,174	3,254	3,564	305,109
Montana	1944	4,844	846	413	305	345	313	371	382	348	346	364	172,837
New Mexico	1918	4,023	158	137	117	148	295	412	677	1,945	2,969	3,212	134,618
North Dakota	1950	3,261	2,815	2,561	2,314	2,418	2,525	2,726	2,733	2,399	2,637	2,732	108,869
Ohio	1920	45,878	38,934	36,862	32,028	35,112	33,957	32,226	34,125	36,790	37,310	39,390	2,271,411
Oklahoma	1920	4,849	2,007	2,195	1,630	1,525	1,342	1,031	1,048	1,008	1,028	974	185,905
Pennsylvania	1918	178,551	90,287	85,365	67,771	65,347	65,425	62,652	65,315	71,501	76,531	80,308	8,650,562
Tennessee	1956	8,848	8,848	7,955	6,785	5,913	5,931	5,860	6,213	6,121	5,990	5,865	424,478
Utah	1947	7,429	6,522	6,858	5,328	4,545	4,955	5,159	4,297	4,360	4,720	4,992	286,396
Virginia	1965	34,053	28,063	29,506	26,826	29,769	27,838	30,332	29,474	30,531	31,654	34,053	971,829
Washington	1918	4,082	473	360	252	242	228	191	235	190	68	55	149,237
West Virginia	1947	176,157	155,891	156,842	119,468	119,692	118,944	113,071	118,499	132,568	141,409	149,191	7,125,726
Wyoming	1945	9,847	2,553	2,117	1,629	1,977	2,024	2,529	2,569	3,124	3,101	3,260	418,213
Other States [1]	----	-----	782	885	795	696	752	759	897	874	762	903	189,717
Total	1947	630,624	500,874	492,704	410,446	412,028	415,512	402,977	422,149	458,928	486,998	512,088	32,209,155

[1] Production, if any, in Alaska, Arizona, California, Georgia, Idaho, Michigan, North Carolina, Oregon, South Dakota, Texas, and North Dakota in 1954 included in "Other States."

Table 11.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1965, by States

State	Number of active mines	Production (net tons): Shipped by rail or water [1]	Production (net tons): Shipped by truck	Production (net tons): Used at mine [2]	Production (net tons): Total	Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama	206	11,834,718	2,566,085	430,789	14,831,592	$7.16	5,286	214	1,131,397	13.11
Alaska	4	877,660	12,984	2,538	893,182	6.82	217	251	54,462	16.40
Arkansas	8	225,747	141	------	225,888	7.27	109	185	20,142	11.21
Colorado	79	3,646,695	1,042,636	101,127	4,790,458	5.10	1,571	213	334,457	14.32
Illinois	90	52,574,221	5,472,171	436,816	58,483,208	3.74	8,296	253	2,100,425	27.84
Indiana	61	12,459,653	1,926,020	1,179,736	15,565,409	3.85	2,520	203	511,648	30.42
Iowa	28	739,653	302,505	1,084	1,043,242	3.54	256	216	55,211	18.90
Kansas	6	883,412	426,071	261	1,309,744	4.64	230	267	61,380	21.34
Kentucky	1,827	73,646,324	12,059,821	59,566	85,765,711	3.78	25,243	188	4,752,508	18.05
Maryland	69	735,897	473,836	------	1,209,733	3.63	375	203	76,132	15.89
Missouri	16	1,795,853	381,952	1,385,938	3,563,743	4.15	396	268	105,985	33.62
Montana:										
Bituminous	10	18,397	43,442	1,349	63,188	7.24	65	158	10,296	6.14
Lignite	3	296,554	4,726	5	301,285	1.96	23	204	4,684	64.32
Total Montana	13	314,951	48,168	1,354	364,473	2.88	88	170	14,980	24.33
New Mexico	8	798,102	2,411,040	7,771	3,211,913	3.33	280	233	65,373	49.13
North Dakota (lignite)	29	2,030,820	383,883	317,232	2,731,935	2.14	307	194	59,652	45.80
Ohio	417	23,480,369	12,835,733	3,073,619	39,389,721	3.71	7,563	233	1,759,420	22.39
Oklahoma	15	958,279	15,733	------	974,012	5.67	245	196	48,053	20.27
Pennsylvania	1,140	62,782,827	15,929,787	1,595,835	80,308,449	5.07	23,850	229	5,459,330	14.71
South Dakota (lignite)	1	------	10,000	------	10,000	4.87	4	125	500	20.00
Tennessee	230	3,682,359	2,182,795	19	5,865,173	3.57	2,397	173	414,602	14.15
Utah	31	4,529,876	430,839	31,288	4,992,003	6.37	1,495	212	317,086	15.74
Virginia	1,271	29,430,868	4,405,817	216,230	34,052,915	4.09	11,623	209	2,425,774	14.04
Washington	5	16,657	38,101	------	54,758	9.07	56	141	7,899	6.93
West Virginia	1,660	142,986,620	3,644,942	2,559,646	149,191,208	4.87	41,008	229	9,382,370	15.90
Wyoming	14	1,406,760	1,300,753	552,280	3,259,793	3.11	317	230	72,947	44.69
Total	7,228	431,833,321	68,301,813	11,953,129	512,088,263	4.44	133,732	219	29,231,733	17.52

[1] Includes coal loaded at mine directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.
[2] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for all other purposes at mine, and transported from mine to point of use by conveyor, tram, or pipeline.
[3] Value received or charged for coal, f.o.b. mine. Includes a value, estimated by producer, for coal not sold.

Table 12.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1965, by districts

District	Number of active mines	Production (net tons): Shipped by rail or water [1]	Production (net tons): Shipped by truck	Production (net tons): Used at mine [2]	Production (net tons): Total	Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
1. Eastern Pennsylvania	865	32,059,379	8,646,798	972,453	41,678,630	$4.33	12,888	222	2,865,401	14.55
2. Western Pennsylvania	367	33,372,023	8,128,629	623,393	42,124,045	5.68	11,845	235	2,789,266	15.10
3. Northern West Virginia	472	47,008,912	974,837	21,918	48,005,667	4.58	11,897	233	2,770,660	17.33
4. Ohio	417	23,480,369	12,835,733	3,073,619	39,389,721	3.71	7,563	233	1,759,420	22.39
5. Michigan	---	---	---	---	---	---	---	---	---	---
6. Panhandle	19	2,265,986	449,213	2,353,289	5,068,488	4.15	1,179	232	273,295	18.55
7. Southern Numbered 1	696	38,204,026	971,846	151,235	39,327,107	5.87	12,560	232	2,908,408	13.52
8. Southern Numbered 2	3,612	125,143,322	14,263,886	302,966	139,710,174	4.26	48,799	200	9,735,919	14.35
9. West Kentucky	92	34,304,729	4,888,294	6,042	39,199,065	3.31	4,680	227	1,064,480	36.82
10. Illinois	90	52,574,221	5,472,171	436,816	58,483,208	3.74	8,296	253	2,100,425	27.84
11. Indiana	61	12,459,653	1,926,020	1,179,736	15,565,409	3.85	2,520	203	511,648	30.42
12. Iowa	28	739,653	302,505	1,084	1,043,242	3.54	256	216	55,211	18.90
13. Southeastern	280	12,741,236	2,939,580	430,789	16,111,605	6.93	5,934	208	1,234,684	13.05
14. Arkansas-Oklahoma	14	672,177	2,316	---	674,493	7.36	213	189	40,274	16.75
15. Southwestern	81	3,191,114	821,581	1,386,199	5,398,894	4.27	767	255	195,286	27.65
16. Northern Colorado	6	463,602	234,296	6,527	704,425	4.14	265	178	47,087	14.96
17. Southern Colorado	76	3,603,984	813,644	94,971	4,512,599	5.63	1,436	219	314,080	14.37
18. New Mexico	5	372,211	2,405,736	7,400	2,785,347	2.45	150	258	38,668	72.04
19. Wyoming	14	1,406,760	1,300,758	552,280	3,259,798	3.11	317	230	72,947	44.69
20. Utah	31	4,529,876	430,839	31,288	4,992,003	6.37	1,495	212	317,086	15.74
21. North-South Dakota	30	2,030,820	393,883	317,232	2,741,935	2.15	311	193	60,152	45.58
22. Montana	13	314,951	48,168	1,354	364,473	2.88	88	170	14,980	24.33
23. Washington	9	894,317	51,085	2,538	947,940	6.95	273	228	62,361	15.20
Total	7,228	431,833,321	68,301,813	11,953,129	512,088,263	4.44	133,732	219	29,231,733	17.52

[1] Includes coal loaded at mine directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.
[2] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for all other purposes at mine, and transported from mine to point of use by conveyor, tram, or pipeline.
[3] Value received or charged for coal, f.o.b. mine. Includes a value, estimated by producer, for coal not sold.

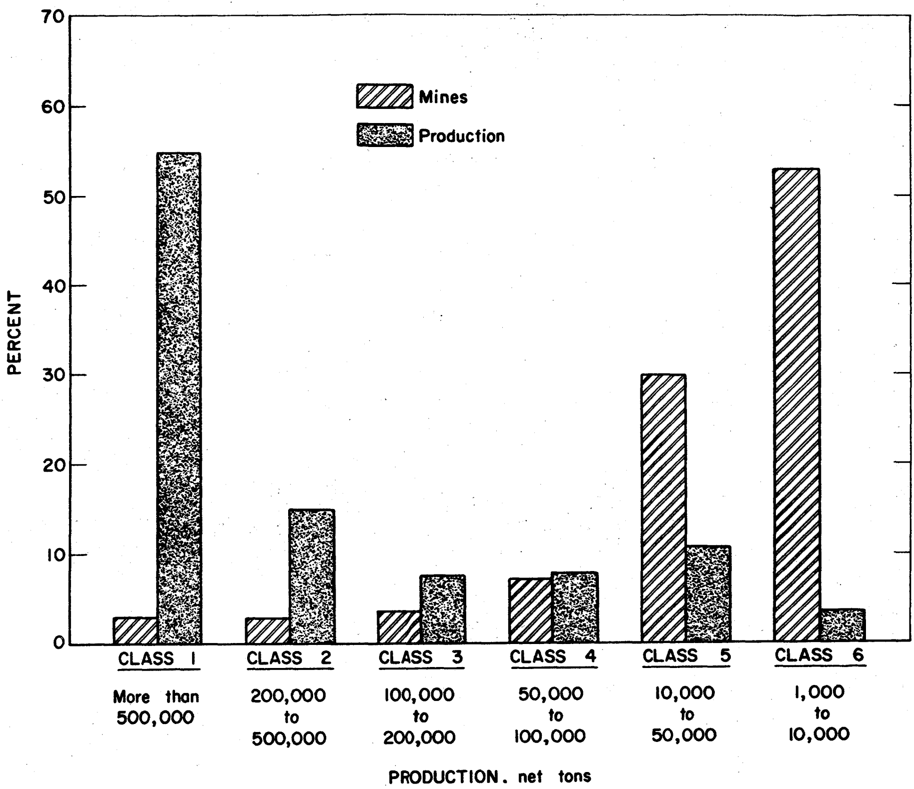

Figure 5.—Percentage of number of mines and of production of bituminous coal and lignite mines in the United States, 1965, by size of output.

Table 13.—Number and production of bituminous coal and lignite mines in the United States, 1965, by States and size of output

State	Class 1—500,000 tons and over				Class 2—200,000 to 500,000 tons				Class 3—100,000 to 200,000 tons			
	Mines		Production		Mines		Production		Mines		Production	
	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage
Alabama	8	3.9	7,890,899	53.2	8	3.9	2,645,626	17.8	13	6.3	1,959,908	13.2
Alaska	---	---	---	---	2	50.0	753,937	84.4	1	25.0	135,434	15.2
Arkansas	---	---	---	---	---	---	---	---	---	---	---	---
Colorado	3	3.8	2,011,392	42.0	3	3.8	859,825	17.9	4	5.1	702,613	14.7
Illinois	37	41.1	52,137,849	89.2	13	14.4	4,702,303	8.0	5	5.6	677,641	1.2
Indiana	13	21.3	12,538,489	80.5	5	8.2	1,939,626	12.5	2	3.3	273,245	1.8
Iowa	---	---	---	---	---	---	---	---	4	14.3	524,126	50.2
Kansas	1	16.7	842,008	64.3	1	16.7	260,683	19.9	1	16.7	180,709	13.8
Kentucky	32	1.8	43,947,642	51.2	32	1.8	10,243,013	12.0	52	2.8	7,284,501	8.5
Maryland	---	---	---	---	1	1.5	203,355	16.8	1	1.4	131,389	10.8
Missouri	3	18.7	2,888,776	81.1	1	6.2	442,222	12.4	---	---	---	---
Montana (bituminous and lignite)	---	---	---	---	1	7.7	298,315	81.9	---	---	---	---
New Mexico	1	12.5	2,397,982	74.7	2	25.0	789,878	24.6	---	---	---	---
North Dakota (lignite)	1	3.5	1,078,145	39.8	2	6.9	684,556	25.0	4	13.8	646,845	23.7
Ohio	21	5.0	22,540,273	57.2	16	3.8	4,728,299	12.0	80	7.2	3,981,521	10.1
Oklahoma	---	---	---	---	2	13.3	533,515	54.8	1	6.7	142,878	14.6
Pennsylvania	39	3.4	40,418,134	50.3	82	2.8	10,295,904	12.8	57	5.0	8,059,938	10.0
South Dakota (lignite)	---	---	---	---	---	---	---	---	---	---	---	---
Tennessee	1	.4	647,032	11.0	2	.9	484,591	8.3	10	4.3	1,418,144	24.2
Utah	4	12.9	2,690,687	58.9	4	12.9	1,168,356	23.4	3	9.7	362,870	7.2
Virginia	8	.6	9,480,913	27.8	13	1.0	4,445,209	13.1	11	.9	1,474,966	4.3
Washington	---	---	---	---	---	---	---	---	---	---	---	---
West Virginia	86	5.2	89,958,184	60.3	80	4.8	24,798,191	16.6	78	4.7	11,251,291	7.5
Wyoming	1	7.2	1,248,692	38.3	4	28.6	1,619,709	49.7	2	14.3	291,369	8.9
Total	259	3.6	292,707,047	57.2	224	3.1	71,897,108	14.0	279	3.9	39,497,883	7.7

Table 13.—Number and production of bituminous coal and lignite mines in the United States, 1965, by States and size of output—Continued

State	Class 4—50,000 to 100,000 tons				Class 5—10,000 to 50,000 tons				Class 6—less than 10,000 tons				Total		
	Mines		Production		Mines		Production		Mines		Production		Mines	Production (net tons)	
	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage		Total	Average per mine
Alabama	10	4.8	746,501	5.0	51	24.8	1,090,704	7.4	116	56.3	497,954	3.4	206	14,831,592	71,998
Alaska	---	---	---	---	---	---	---	---	1	25.0	3,811	.4	4	893,182	223,296
Arkansas	1	12.5	87,492	38.7	5	62.5	128,662	57.0	2	25.0	9,734	4.3	8	225,888	28,236
Colorado	9	11.4	665,260	13.9	19	24.0	396,298	8.3	41	51.9	155,070	3.2	79	4,790,458	60,639
Illinois	6	6.7	421,537	.7	17	18.9	482,971	.8	12	13.3	60,907	.1	90	58,483,208	649,813
Indiana	6	9.8	376,548	2.4	15	24.6	339,859	2.2	20	32.8	97,642	.6	61	15,565,409	255,171
Iowa	4	14.3	264,105	25.3	7	25.0	193,935	18.6	13	46.4	61,076	5.9	28	1,043,242	37,259
Kansas	---	---	---	---	1	16.6	14,358	1.1	2	33.3	11,986	.9	6	1,309,744	218,291
Kentucky	112	6.1	7,831,402	9.1	550	30.1	12,120,383	14.1	1,049	57.4	4,338,770	5.1	1,827	85,765,711	46,943
Maryland	2	2.9	157,084	13.0	22	31.9	551,255	45.6	43	62.3	166,650	13.8	69	1,209,733	17,323
Missouri	2	12.5	112,058	3.1	5	31.3	105,854	3.0	5	31.3	14,833	.4	16	3,563,743	222,734
Montana (bituminous and lignite)	---	---	---	---	2	15.4	36,114	9.9	10	76.9	30,044	8.2	13	364,473	28,036
New Mexico	---	---	---	---	1	12.5	11,000	.3	4	50.0	13,058	.4	8	3,211,913	401,489
North Dakota (lignite)	2	6.9	149,205	5.5	5	17.2	110,282	4.0	15	51.7	68,402	2.5	29	2,731,935	94,205
Ohio	59	14.2	4,024,816	10.2	142	34.1	3,500,488	8.9	149	35.7	614,324	1.6	417	39,389,721	94,460
Oklahoma	3	20.0	208,974	21.5	3	20.0	76,488	7.8	6	40.0	12,662	1.3	15	974,012	64,934
Pennsylvania	153	13.4	10,152,361	12.7	379	33.3	9,483,302	11.8	480	42.1	1,903,810	2.4	1,140	80,308,449	70,446
South Dakota (lignite)	---	---	---	---	1	100.0	10,000	100.0	---	---	---	---	1	10,000	10,000
Tennessee	16	7.0	1,029,402	17.5	73	31.7	1,763,859	30.1	128	55.7	522,145	8.9	230	5,865,173	25,501
Utah	6	19.3	502,408	10.1	11	35.5	254,084	5.1	3	9.7	14,148	.3	31	4,992,003	161,032
Virginia	51	4.0	3,444,008	10.1	521	41.0	11,844,382	34.8	667	52.5	3,363,437	9.9	1,271	34,052,915	26,792
Washington	---	---	---	---	1	20.0	25,502	46.6	4	80.0	29,256	53.4	5	54,758	10,952
West Virginia	112	6.8	8,152,376	5.5	535	32.2	11,751,897	7.9	769	46.3	3,279,269	2.2	1,660	149,191,208	89,874
Wyoming	1	7.1	64,612	2.0	1	7.1	19,430	.6	5	35.7	15,981	.5	14	3,259,793	232,842
Total	555	7.7	38,390,149	7.5	2,367	32.7	54,311,107	10.6	3,544	49.0	15,284,969	3.0	7,228	512,088,263	70,848

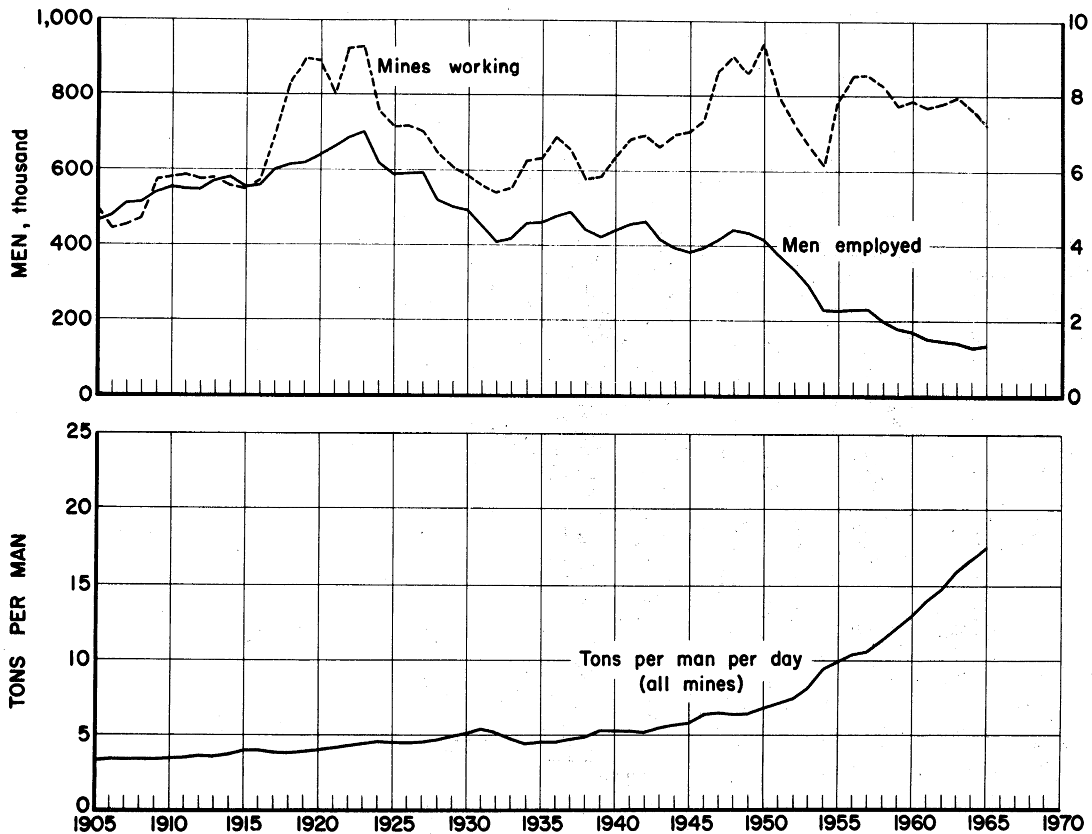

Figure 6.—Trends of employment, mechanization, and output per man at bituminous coal and lignite mines in the United States, 1905–65.

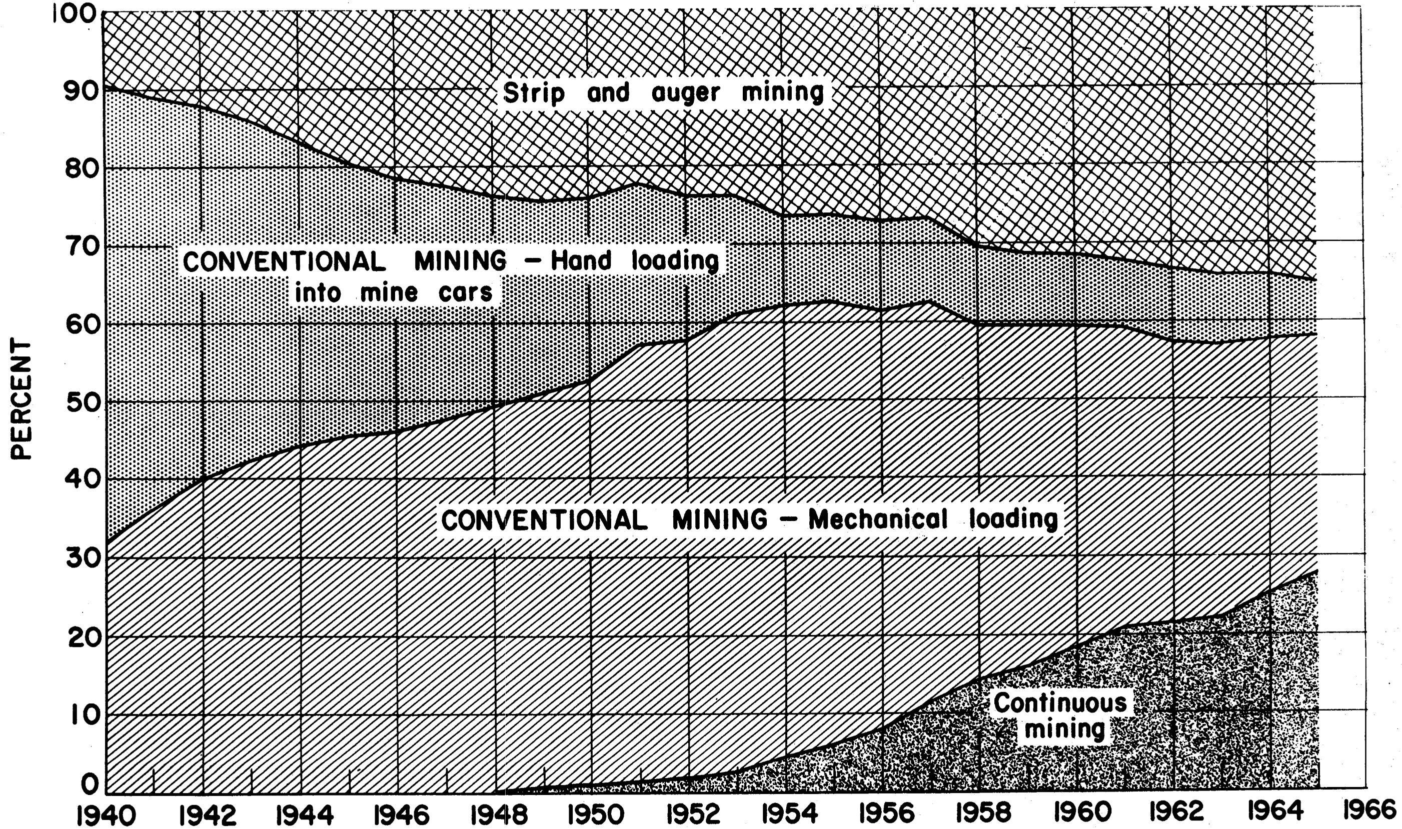

Figure 7.—Percentage of total production of bituminous coal and lignite in the United States, 1940–65, by type of mining and loading.

The largest number of mine cars (27 percent) were 4- to 5-ton capacity. However, 17 percent of all rail mine cars were large, 10 tons and over, hauling the largest amount (36 percent) of the tonnage handled by rail mine cars. In contrast, the most frequent size of rubber-tired mine cars was 2-ton capacity; cars of this size hauled 50 percent of the tonnage handled by rubber-tired mine cars.

A recent development in underground haulage is the introduction of a medium-sized rubber-tired mine car that is used in conjunction with a rubber-tired tractor to transport the coal from the loading machine to the main haulageway. Practically all of the rubber-tired haulage equipment, exclusive of shuttle cars, is located in small mines in Virginia, eastern Kentucky, and southern West Virginia. Another innovation, particularly for small mines, has been the introduction of the shuttle buggy. This is a self-powered rubber-tired mine car which is hand loaded. The largest number of these shuttle buggies is used in eastern Kentucky and West Virginia.

STRIP MINING

Strip mines have two substantial advantages over underground mines: (1) The output per man per day in strip mines is more than double that in underground mines, and (2) the average value of strip coal, f.o.b. mines, is about one-third less than the average value of coal from underground mines. See figures 8 and 9.

The rapid growth of strip mining was made possible by the development of larger and improved stripping and drilling equipment and trucks.

An increase in the average capacity of trucks used in strip mines has reduced the number required. The average hauling distance from strip mines to tipples or ramps is approximately 5 miles.

The average thickness of overburden at all bituminous coal and lignite strip mines in the United States was 46 feet in 1960, the latest year for which figures are available. In 1960 several strip mines handled an average of more than 70 feet of overburden and a few mines handled more than 80 feet.

Table 14.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at underground bituminous coal and lignite mines in the United States, 1965, by States

State	Number of active mines	Production (net tons)	Average value per ton, f.o.b. mines	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama	143	9,922,627	$8.22	4,514	211	952,612	10.42
Arkansas	4	74,295	7.46	56	222	12,416	5.98
Colorado	72	3,520,329	5.73	1,456	211	307,683	11.44
Illinois	41	25,813,625	3.78	5,172	238	1,230,272	20.98
Indiana	20	2,355,307	4.07	1,087	151	164,565	14.31
Iowa	9	196,484	3.98	115	179	20,603	9.54
Kentucky	1,594	50,688,234	4.24	21,628	185	4,009,799	12.64
Maryland	32	435,101	4.02	242	194	46,967	9.26
Missouri	3	25,701	4.84	46	161	7,385	3.48
Montana:							
Bituminous	8	61,044	7.23	61	166	10,120	6.03
Lignite	2	2,970	5.72	7	101	706	4.21
Total Montana	10	64,014	7.16	68	159	10,826	5.91
New Mexico	5	434,320	9.07	152	202	30,720	14.14
North Dakota (lignite)	1	1,341	4.57	2	82	164	8.18
Ohio	93	11,267,581	4.31	3,709	223	827,117	13.61
Oklahoma	3	8,832	7.50	19	103	1,945	4.54
Pennsylvania	494	55,674,900	5.68	18,515	229	4,244,567	13.12
Tennessee	180	3,581,134	3.80	1,906	171	326,728	10.96
Utah	31	4,992,003	6.37	1,495	212	317,086	15.74
Virginia	1,153	29,365,189	4.27	11,059	209	2,307,863	12.72
Washington	4	52,100	9.09	54	143	7,721	6.75
West Virginia	1,383	134,064,281	5.00	38,361	232	8,913,932	15.04
Wyoming	5	123,838	6.10	79	179	14,109	8.78
Total	5,280	332,661,236	4.93	109,735	216	23,755,080	14.00

Table 15.—Underground production of bituminous coal and lignite in the United States, 1965, by States and mining methods

State	Cut by hand and shot from solid		Cut by machines				Mined by continuous mining machine		Total underground (net tons)
	Net tons	Percentage of total underground	Net tons	Percentage of total underground	Number of coal-cutting machines	Average output per machine (net tons)	Net tons	Percentage of total underground	
Alabama	230,576	2.3	9,592,051	96.7	143	67,077	100,000	1.0	9,922,627
Arkansas	3,753	5.1	70,542	94.9	7	10,077	----	----	74,295
Colorado	182,894	5.2	1,445,236	41.1	120	12,044	1,892,199	53.7	3,520,329
Illinois	----	----	15,730,885	60.9	76	206,985	10,082,740	39.1	25,813,625
Indiana	----	----	2,355,307	100.0	47	50,113	----	----	2,355,307
Iowa	6,421	3.3	190,063	96.7	10	19,006	----	----	196,484
Kentucky	3,694,236	7.3	39,889,537	78.7	1,185	33,662	7,104,461	14.0	50,688,234
Maryland	40,454	9.3	254,593	58.5	29	8,779	140,054	32.2	435,101
Missouri	----	----	25,701	100.0	4	6,425	----	----	25,701
Montana:									
Bituminous	----	----	61,044	100.0	14	4,360	----	----	61,044
Lignite	2,970	100.0	----	----	----	----	----	----	2,970
Total Montana	2,970	4.6	61,044	95.4	14	4,360	----	----	64,014
New Mexico	9,238	2.1	3,820	.9	1	3,820	421,262	97.0	434,320
North Dakota (lignite)	1,341	100.0	----	----	----	----	----	----	1,341
Ohio	19,134	.2	6,079,194	53.9	123	49,424	5,169,253	45.9	11,267,581
Oklahoma	2,175	24.6	6,657	75.4	3	2,219	----	----	8,832
Pennsylvania	379,042	.7	11,531,110	20.7	504	22,879	43,764,748	78.6	55,674,900
Tennessee	294,478	8.2	2,734,222	76.4	139	19,671	552,434	15.4	3,581,134
Utah	----	----	1,689,498	33.8	51	33,127	3,302,505	66.2	4,992,003
Virginia	3,904,740	13.3	19,562,793	66.6	836	23,400	5,897,656	20.1	29,365,189
Washington	52,100	100.0	----	----	----	----	----	----	52,100
West Virginia	2,459,286	1.8	68,093,905	50.8	1,473	46,228	63,511,090	47.4	134,064,281
Wyoming	----	----	123,838	100.0	19	6,518	----	----	123,838
Total	11,282,838	3.4	179,439,996	53.9	4,784	37,508	141,938,402	42.7	332,661,236

Table 16.—Summary of drilling operations at underground bituminous coal and lignite mines in the United States

Year	Number of mines using power drills	Number of power drills [1]: Electric	Number of power drills [1]: Face or coal	Number of power drills [1]: Compressed air	Number of power drills [1]: Roof or rock	Number of power drills [1]: Total	Production (thousand net tons): Where shot holes are power-drilled	Production (thousand net tons): Where shot holes are hand-drilled	Production (thousand net tons): Where no shot-holes are required (continuous mining)	Production (thousand net tons): Total	Production, percent: Where shot holes are power-drilled	Production, percent: Where shot holes are hand-drilled	Production, percent: Where no shot-holes are required (continuous mining)
1936	599	3,968	-----	1,302	-----	5,270	111,950	299,012	-----	410,962	27.2	72.8	-----
1937	NA	NA	-----	NA	-----	NA	NA	NA	-----	413,780	NA	NA	-----
1938	1,061	5,071	-----	1,465	-----	6,536	122,581	195,557	-----	318,138	38.5	61.5	-----
1939	NA	NA	-----	NA	-----	NA	NA	NA	-----	357,133	NA	NA	-----
1940	1,172	6,613	-----	1,378	-----	7,991	197,083	220,521	-----	417,604	47.2	52.8	-----
1941	1,266	7,697	-----	1,502	-----	9,199	237,213	221,865	-----	459,078	51.7	48.3	-----
1942	1,364	8,482	-----	1,564	-----	10,046	281,530	233,960	-----	515,490	54.6	45.4	-----
1943	1,376	8,930	-----	1,630	-----	10,560	299,805	210,687	-----	510,492	58.7	41.3	-----
1944	1,501	9,755	-----	1,903	-----	11,658	324,116	194,562	-----	518,678	62.5	37.5	-----
1945	1,504	10,267	-----	1,855	-----	12,122	302,786	164,844	-----	467,630	64.7	35.3	-----
1946	1,702	10,968	-----	1,884	-----	12,852	278,734	142,224	-----	420,958	66.2	33.8	-----
1947	2,522	12,940	-----	1,449	-----	14,389	351,866	139,363	-----	491,229	71.6	28.4	-----
1948	2,798	13,970	-----	1,312	-----	15,282	336,873	122,689	450	460,012	73.2	26.7	0.1
1949	2,923	14,087	-----	1,411	-----	15,498	251,829	77,894	2,600	331,823	75.7	23.5	.8
1950	3,112	14,277	-----	1,282	-----	15,559	286,661	101,333	4,850	392,844	73.0	25.8	1.2
1951	3,027	14,231	-----	1,345	-----	15,576	324,645	85,136	6,061	415,842	78.0	20.5	1.5
1952	2,830	13,468	-----	1,292	-----	14,760	284,048	64,162	8,215	356,425	79.7	18.0	2.3
1953	2,486	12,054	-----	1,053	-----	13,107	293,161	44,560	11,830	349,551	83.9	12.7	3.4
1954	2,137	10,782	-----	885	-----	11,667	233,557	39,219	16,336	289,112	80.7	13.6	5.7
1955	2,003	9,533	-----	476	-----	10,009	285,348	30,657	27,460	343,465	83.1	8.9	8.0
1956	4,033	(1)	11,021	(1)	2,443	13,464	306,675	19,192	39,907	365,774	83.8	5.3	10.9
1957	4,152	(1)	10,938	(1)	2,981	13,919	294,186	12,680	53,783	360,649	81.6	3.5	14.9
1958	4,410	(1)	9,691	(1)	2,947	12,638	216,226	14,285	56,373	286,884	75.4	5.0	19.6
1959	3,979	(1)	8,524	(1)	2,814	11,338	207,043	10,599	65,792	283,434	73.1	3.7	23.2
1960	4,294	(1)	8,265	(1)	2,840	11,105	194,956	12,004	77,928	284,888	68.4	4.2	27.4
1961	4,333	(1)	7,837	(1)	3,153	10,990	181,741	6,704	84,321	272,766	66.6	2.5	30.9
1962	4,660	(1)	7,744	(1)	3,121	10,865	187,324	3,768	90,174	281,266	66.6	1.4	32.0
1963	4,868	(1)	7,496	(1)	2,913	10,409	193,036	4,870	104,350	302,256	63.9	1.6	34.5
1964	4,734	(1)	7,185	(1)	2,847	10,032	193,044	4,087	124,677	321,808	60.0	1.3	38.7
1965	4,353	(1)	6,720	(1)	2,876	9,596	188,245	2,478	141,938	332,661	56.6	.7	42.7

NA Not available.

[1] Total number of power drills before 1956 are not strictly comparable with the figures for 1956 to date. Data were collected by "type" of drills before 1956 and by "use" of drills 1956 to date. Most of the "electric" drills were used in coal and most of the "compressed air" drills were used in rock. "Face or coal" drills include hand-held, post mounted, and mobile drills. "Roof or rock" drills include rotary and percussion drills.

Table 17.—Use of power drills in underground bituminous coal and lignite mines in the United States, 1965, by States

State	Number of power drills							Production where shotholes are power-drilled (net tons)			
	Number of mines using power drills	Face or coal drills		Roof or rock drills				Handheld and post-mounted drills	Mobile drills	Total	Percentage of total underground
		Handheld and post-mounted	Mobile	Roof bolting		Other uses					
				Rotary	Percussion	Rotary	Percussion				
Alabama	89	175	20	52	43	22	15	7,247,502	2,519,218	9,766,720	98.4
Arkansas	4	9	---	1	---	3	---	74,295	---	74,295	100.0
Colorado	60	146	13	9	20	---	4	1,061,394	556,507	1,617,901	46.0
Illinois	39	17	74	125	---	2	---	135,480	15,595,405	15,730,885	60.9
Indiana	20	22	20	24	---	---	1	392,731	1,962,576	2,355,307	100.0
Iowa	5	6	3	4	---	---	---	17,094	166,728	183,822	93.6
Kentucky	1,263	1,589	153	279	82	5	28	24,256,615	18,547,750	42,804,365	84.4
Maryland	26	36	---	4	1	---	---	287,702	---	287,702	66.1
Missouri	1	1	---	---	---	---	---	22,648	---	22,648	88.1
Montana:											
Bituminous	8	11	---	2	---	---	---	61,044	---	61,044	100.0
Lignite	2	2	---	---	---	---	---	2,970	---	2,970	100.0
Total Montana	10	13	---	2	---	---	---	64,014	---	64,014	100.0
New Mexico	5	8	---	2	8	---	---	13,058	---	13,058	3.0
North Dakota (lignite)	1	1	---	---	---	---	---	1,341	---	1,341	100.0
Ohio	87	108	29	84	4	---	---	940,036	5,144,797	6,084,833	54.0
Oklahoma	2	2	---	---	---	---	---	4,872	---	4,872	55.2
Pennsylvania	301	449	44	270	242	28	105	4,827,149	6,455,540	11,282,689	20.3
Tennessee	104	183	4	18	2	2	1	2,587,263	243,637	2,830,900	79.1
Utah	30	27	41	7	56	---	30	241,262	1,448,236	1,689,498	33.8
Virginia	1,089	1,302	20	61	68	7	16	18,464,693	4,548,081	23,012,774	78.4
Washington	3	17	---	---	---	---	---	42,499	---	42,499	81.6
West Virginia	1,209	1,970	209	781	277	19	59	42,882,565	27,368,777	70,251,342	52.4
Wyoming	5	8	1	3	---	---	---	120,453	3,385	123,838	100.0
Total	4,353	6,089	631	1,726	803	88	259	103,684,666	84,560,637	188,245,303	56.6

Table 18.—Number of underground bituminous coal and lignite mines and number of haulage units in use in the United States, in selected years [1]

Year	Number of underground mines	Locomotives				Rope-haulage units			Shuttle cars			Gathering and haulage conveyors	Animals
		Trolley	Battery	Other types	Total	Portable	Stationary	Total	Cable reel	Battery	Total		
1924	7,352	[2] 12,765	1,515	443	14,723	NA	NA	649	NA	NA	NA	NA	36,352
1946	5,888	14,110	1,011	110	15,231	4,084	1,009	5,093	NA	NA	NA	457	10,185
1948	7,108	14,617	904	74	15,595	3,886	1,044	4,930	NA	NA	NA	755	10,834
1949	6,798	14,090	928	59	15,077	3,904	1,073	4,977	2,144	623	2,767	860	10,313
1950	7,559	13,822	949	62	14,833	4,225	1,037	5,262	2,782	512	3,294	1,013	10,033
1951	6,225	13,327	900	51	14,278	3,875	916	4,791	3,191	567	3,758	1,094	7,478
1952	5,632	12,545	812	41	13,398	3,584	852	4,436	3,382	462	3,844	1,066	6,555
1953	5,034	11,311	678	45	12,034	2,838	727	3,565	3,797	425	4,222	1,042	5,354
1954	4,653	10,155	762	38	10,955	1,926	781	2,707	4,400	431	4,831	1,081	5,409
1955	6,035	9,538	658	40	10,236	1,327	577	1,904	4,375	239	4,614	1,002	6,440
1956	6,542	9,445	861	102	10,408	1,420	575	1,995	4,757	257	5,014	1,114	6,097
1957	6,512	8,997	898	138	10,033	1,214	616	1,830	5,129	257	5,386	1,233	5,054
1958	6,319	8,057	920	138	9,115	926	538	1,464	4,871	259	5,130	1,235	4,678
1959	5,815	7,263	949	137	8,349	900	504	1,404	4,795	255	5,050	1,416	4,063
1960	5,989	6,922	946	173	8,041	892	510	1,402	4,722	236	4,958	1,566	3,503
1961	5,843	6,362	583	162	7,107	(3)	(3)	(3)	4,687	182	4,869	1,635	(3)
1962	5,946	5,874	461	123	6,458	(3)	(3)	(3)	4,746	212	4,958	1,786	(3)
1963	6,129	5,273	484	113	5,870	(3)	(3)	(3)	4,952	175	5,127	1,998	(3)
1964	5,746	4,974	423	50	5,447	(3)	(3)	(3)	4,933	115	5,048	2,150	(3)
1965	5,280	4,637	341	85	5,063	(3)	(3)	(3)	4,971	189	5,160	2,402	(3)

NA Not available.
[1] Exclusive of lignite and Virginia semianthracite mines in 1946, 1948, and 1949.
[2] Includes combination trolley and battery locomotives.
[3] Canvass discontinued.

AUGER MINING

Augers are generally used in areas where strip mining has become economically impracticable because the overburden is thick. They were used first about 1945, and separate statistics on coal-recovery augers begin with 1951. The rapidly expanded production of coal by stripping during World War II in the mountainous areas of the northern Appalachian region left many miles of high wall containing exposed coal seams. After several years of experimentation, large, efficient augers as much as 84 inches in diameter were developed to recover the coal from these exposed coal seams.

Production at auger mines increased rapidly from 205,000 tons in 1951 to 14 million tons in 1965. Augers were used to mine coal in eight States in 1965. A few coal-recovery augers have been sold for underground use; these units and the coal produced by them have been included with coal loaded mechanically underground.

MECHANICAL LOADING

Prior to 1925 less than 1 percent of the total underground output was mechanically loaded. During the following 10 years (1925-35), as better machines were developed, mechanical loading increased more than 1 percent per year, and in 1935 almost 14 percent of the total underground output was mechanically loaded. Development was rapid in some States but practically nonexistent in others. The percentage of underground production mechanically loaded in 1935 in certain States was as follows: Wyoming (90), Illinois (56), Indiana (64), Pennsylvania (7), West Virginia (2), and Kentucky (1). During the next 20 years (1935–55), mechanical loading increased rapidly, averaging a gain of more than 3 percent per year, until it included 85 percent of the underground output in 1955.

The increase in percentage of underground output mechanically loaded has leveled off. During the past ten years (1955-65) mechanical loading increased from 85 to 89 percent of the underground production. Output from mobile loading

Table 19.—Haulage units and length of rail track in use in bituminous coal and lignite underground mines in the United States, 1965, by States

State	Locomotives			Tractors, rubber-tired	Mine cars [1]		Shuttle cars		Shuttle buggies [1]	Gathering and haulage conveyors [1]		Rail track reported (miles)		
	Trolly	Battery	All others		Rail	Rubber-tired	Cable reel	Battery		Units	Miles	Main line	All other	Total
Alabama	135	---	---	28	2,927	---	182	---	3	67	27.1	77.2	46.5	123.7
Arkansas	---	1	---	---	42	---	---	---	---	---	---	.8	---	.8
Colorado	83	29	---	1	2,800	---	100	15	2	25	7.8	40.9	15.3	56.2
Illinois	94	22	---	11	2,316	---	293	---	---	157	65.8	40.2	24.3	64.5
Indiana	68	3	---	---	1,077	---	58	---	1	16	3.5	33.7	25.1	58.8
Iowa	4	1	---	---	493	---	7	---	---	---	---	7.5	.3	7.8
Kentucky	707	54	2	649	8,090	1,431	755	97	695	226	69.4	279.9	120.5	400.4
Maryland	2	4	---	2	192	12	7	---	23	10	1.8	5.6	2.1	7.7
Missouri	---	1	---	---	36	---	---	---	---	---	---	2.0	.5	2.5
Montana:														
Bituminous	8	---	1	---	142	---	6	1	---	---	---	3.0	.1	3.1
Lignite	---	1	1	1	26	---	---	---	---	---	---	1.2	---	1.2
Total Montana	8	1	2	1	168	---	6	1	---	---	---	4.2	.1	4.3
New Mexico	9	1	---	---	99	---	10	---	---	1	.3	5.5	1.0	6.5
Ohio	190	16	7	4	3,049	15	136	---	---	66	14.6	101.9	39.0	140.9
Oklahoma	---	---	---	---	8	---	---	---	---	---	---	.3	.2	.5
Pennsylvania	1,321	84	11	119	22,634	192	979	14	17	557	163.8	618.3	316.4	934.7
Tennessee	85	9	---	21	642	73	53	---	39	1	.4	22.9	9.2	32.1
Utah	107	3	---	4	2,602	4	146	6	---	47	11.1	90.8	18.0	108.8
Virginia	362	49	1	786	3,497	3,988	202	4	39	144	66.6	355.9	95.3	451.2
Washington	4	---	---	---	27	1	---	---	---	---	---	1.6	---	1.6
West Virginia	1,458	63	62	501	36,258	1,751	2,030	52	589	1,078	345.7	953.7	308.5	1262.2
Wyoming	---	---	---	---	---	---	7	---	1	7	1.4	---	---	-----
Total	4,637	341	85	2,127	86,957	7,467	4,971	189	1,409	2,402	779.3	2642.9	1022.3	3665.2

[1] See table 20 for percentage of tonnage not reported.

Table 20.—Method of haulage at bituminous coal and lignite underground mines in the United States, 1965, by States

State	Production (net tons) from mines: Reporting rail mine cars	Reporting rubber-tired mine cars	Reporting shuttle buggies	With conveyor haulage only	Not reporting type of haulage	Total	Percentage of total underground production from mines: Reporting rail mine cars	Reporting rubber-tired mine cars	Reporting shuttle buggies	With conveyor haulage only	Not reporting type of haulage	Total
Alabama	5,027,362	---	3,730	4,019,015	872,520	9,922,627	50.7	---	.1	40.5	8.7	100.0
Arkansas	44,889	---	---	---	29,406	74,295	60.4	---	---	---	39.6	100.0
Colorado	1,536,751	---	---	1,696,344	287,234	3,520,329	43.7	---	---	48.2	8.1	100.0
Illinois	8,084,140	---	---	16,738,518	990,967	25,813,625	31.3	---	---	64.9	3.8	100.0
Indiana	1,043,877	---	---	1,293,842	17,588	2,355,307	44.3	---	---	54.9	.8	100.0
Iowa	196,484	---	---	---	---	196,484	100.0	---	---	---	---	100.0
Kentucky	20,683,282	7,408,044	2,520,235	10,849,931	9,226,742	50,688,234	40.8	14.6	5.0	21.4	18.2	100.0
Maryland	47,445	45,411	84,041	215,073	43,131	435,101	10.9	10.4	19.3	49.5	9.9	100.0
Missouri	22,648	---	---	---	3,053	25,701	88.1	---	---	---	11.9	100.0
Montana:												
Bituminous	61,044	---	---	---	---	61,044	100.0	---	---	---	---	100.0
Lignite	2,970	---	---	---	---	2,970	100.0	---	---	---	---	100.0
Total Montana	64,014	---	---	---	---	64,014	100.0	---	---	---	---	100.0
New Mexico	423,954	---	---	---	10,866	434,820	97.6	---	---	---	2.4	100.0
North Dakota (lignite)	---	---	---	---	1,341	1,341	---	---	---	---	100.0	100.0
Ohio	10,165,259	18,608	---	971,183	112,531	11,267,581	90.2	.2	---	8.6	1.0	100.0
Oklahoma	2,175	---	---	---	6,657	8,832	24.6	---	---	---	75.4	100.0
Pennsylvania	40,219,658	347,124	52,236	14,632,532	423,350	55,674,900	72.2	.6	.1	26.3	.8	100.0
Tennessee	1,357,988	326,499	91,610	140,000	1,665,037	3,581,134	37.9	9.1	2.6	3.9	46.5	100.0
Utah	3,968,922	25,812	---	840,850	156,419	4,992,003	79.5	.5	---	16.9	3.1	100.0
Virginia	6,633,361	9,494,572	59,202	7,529,772	5,648,282	29,365,189	22.6	32.3	.2	25.7	19.2	100.0
Washington	42,499	9,601	---	---	---	52,100	81.6	18.4	---	---	---	100.0
West Virginia	89,825,305	5,142,282	2,374,456	31,476,986	5,245,252	134,064,281	67.0	3.8	1.8	23.5	3.9	100.0
Wyoming	---	---	3,385	---	120,453	123,838	---	---	2.7	---	97.3	100.0
Total	189,390,013	22,817,953	5,188,895	90,404,046	24,860,329	332,661,236	56.9	6.9	1.5	27.2	7.5	100.0

Table 21.—Rail mine cars used at bituminous coal and lignite underground mines in the United States, 1965, by States [1]

State	Capacity: 1 ton	2 tons	3 tons	4–5 tons	6–9 tons	10 tons and over	Total
			NUMBER REPORTED				
Alabama	105	19	1	1,559	1,203	40	2,927
Arkansas	24	18	---	---	---	---	42
Colorado	50	2,128	180	351	15	76	2,800
Illinois	251	964	36	255	675	135	2,316
Indiana	67	120	390	360	140	---	1,077
Iowa	335	128	30	---	---	---	493
Kentucky	55	1,127	1,118	3,075	897	1,818	8,090
Maryland	126	66	---	---	---	---	192
Missouri	36	---	---	---	---	---	36
Montana:							
Bituminous	---	76	50	16	---	---	142
Lignite	26	---	---	---	---	---	26
Total Montana	26	76	50	16	---	---	168
New Mexico	5	---	---	---	---	94	99
Ohio	258	285	111	625	768	1,002	3,049
Oklahoma	---	---	8	---	---	---	8
Pennsylvania	2,408	3,023	4,682	1,938	8,015	2,568	22,634
Tennessee	124	77	131	308	2	---	642
Utah	---	21	301	1,209	1,071	---	2,602
Virginia	324	151	823	1,204	180	815	3,497
Washington	---	---	---	27	---	---	27
West Virginia	232	2,130	8,545	12,469	5,086	7,796	36,258
Total	4,426	10,333	16,406	23,396	18,052	14,344	86,957
			PERCENTAGE OF TOTAL				
Alabama	3.6	0.6	0.1	53.2	41.1	1.4	100.0
Arkansas	57.1	42.9	---	---	---	---	100.0
Colorado	1.8	76.0	6.4	12.6	.5	2.7	100.0
Illinois	10.9	41.6	1.6	11.0	29.1	5.8	100.0
Indiana	6.2	11.2	36.2	33.4	13.0	---	100.0
Iowa	67.9	26.0	6.1	---	---	---	100.0
Kentucky	.7	13.9	13.8	38.0	11.1	22.5	100.0
Maryland	65.6	34.4	---	---	---	---	100.0
Missouri	100.0	---	---	---	---	---	100.0
Montana:							
Bituminous	---	53.5	35.2	11.3	---	---	100.0
Lignite	100.0	---	---	---	---	---	100.0
Total Montana	15.5	45.2	29.8	9.5	---	---	100.0
New Mexico	5.0	---	---	---	---	95.0	100.0
Ohio	8.5	9.3	3.6	20.5	25.2	32.9	100.0
Oklahoma	---	---	100.0	---	---	---	100.0
Pennsylvania	10.6	13.4	20.7	8.6	35.4	11.3	100.0
Tennessee	19.3	12.0	20.4	48.0	.3	---	100.0
Utah	---	.8	11.6	46.5	41.1	---	100.0
Virginia	9.3	4.3	23.5	34.4	5.2	23.3	100.0
Washington	---	---	---	100.0	---	---	100.0
West Virginia	.6	5.9	23.6	34.4	14.0	21.5	100.0
Total	5.1	11.9	18.9	26.9	20.7	16.5	100.0

[1] See table 20 for percentage of tonnage not reported.

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Table 22.—Rail mine car haulage at bituminous coal and lignite underground mines in the United States, 1965, by States [1]

State	Production, by size of mine car reported						
	1 ton	2 tons	3 tons	4–5 tons	6–9 tons	10 tons and over	Total
NET TONS							
Alabama	75,752	13,389	10,379	1,790,957	2,900,197	236,688	5,027,362
Arkansas	29,561	15,328	---	---	---	---	44,889
Colorado	37,355	874,031	22,654	405,753	22,590	174,368	1,536,751
Illinois	87,269	498,719	88,839	1,008,597	4,053,742	2,346,974	8,084,140
Indiana	69,376	185,322	548,787	83,675	156,717	---	1,043,877
Iowa	25,785	110,541	60,158	---	---	---	196,484
Kentucky	32,696	1,710,390	2,165,999	4,958,272	4,665,206	7,150,719	20,683,282
Maryland	40,615	6,830	---	---	---	---	47,445
Missouri	22,648	---	---	---	---	---	22,648
Montana:							
Bituminous	---	21,230	14,130	25,684	---	---	61,044
Lignite	2,970	---	---	---	---	---	2,970
Total Montana	2,970	21,230	14,130	25,684	---	---	64,014
New Mexico	2,692	---	---	---	---	421,262	423,954
Ohio	89,480	130,433	152,918	1,935,379	2,222,617	5,634,432	10,165,259
Oklahoma	---	---	2,175	---	---	---	2,175
Pennsylvania	793,797	1,422,775	4,005,299	2,764,829	21,062,883	10,170,075	40,219,658
Tennessee	157,581	104,898	260,576	784,368	50,565	---	1,357,988
Utah	---	12,918	179,217	2,008,065	1,768,722	---	3,968,922
Virginia	87,381	201,424	2,048,211	1,138,892	664,416	2,493,037	6,633,361
Washington	---	---	---	42,499	---	---	42,499
West Virginia	146,592	1,694,904	10,810,046	23,372,287	13,913,612	39,887,864	89,825,305
Total	1,701,550	7,003,132	20,369,388	40,319,257	51,481,267	68,515,419	189,390,013
PERCENTAGE OF TOTAL							
Alabama	1.5	0.3	0.2	35.6	57.7	4.7	100.0
Arkansas	65.9	34.1	---	---	---	---	100.0
Colorado	2.4	56.9	1.5	26.4	1.5	11.3	100.0
Illinois	1.1	6.2	1.1	12.5	50.1	29.0	100.0
Indiana	6.6	17.8	52.6	8.0	15.0	---	100.0
Iowa	13.1	56.3	30.6	---	---	---	100.0
Kentucky	.1	8.3	10.5	24.0	22.5	34.6	100.0
Maryland	85.6	14.4	---	---	---	---	100.0
Missouri	100.0	---	---	---	---	---	100.0
Montana:							
Bituminous	---	34.8	23.1	42.1	---	---	100.0
Lignite	100.0	---	---	---	---	---	100.0
Total Montana	4.6	33.2	22.1	40.1	---	---	100.0
New Mexico	.6	---	---	---	---	99.4	100.0
Ohio	.9	1.3	1.5	19.0	21.9	55.4	100.0
Oklahoma	---	---	100.0	---	---	---	100.0
Pennsylvania	2.0	3.5	9.9	6.9	52.4	25.3	100.0
Tennessee	11.6	7.7	19.2	57.8	3.7	---	100.0
Utah	---	.3	4.5	50.6	44.6	---	100.0
Virginia	1.3	3.0	30.9	17.2	10.0	37.6	100.0
Washington	---	---	---	100.0	---	---	100.0
West Virginia	.2	1.9	12.0	26.0	15.5	44.4	100.0
Total	.9	3.7	10.7	21.3	27.2	36.2	100.0

[1] See table 20 for percentage of tonnage not reported.

Table 23.—Rubber-tired mine cars used at bituminous coal and lignite underground mines in the United States, 1965, by States [1]

State	Capacity						
	1 ton	2 tons	3 tons	4–5 tons	6–9 tons	10 tons and over	Total
			NUMBER REPORTED				
Kentucky	493	639	251	41	2	5	1,431
Maryland	---	12	---	---	---	---	12
Ohio	---	13	2	---	---	---	15
Pennsylvania	36	89	51	2	2	12	192
Tennessee	8	56	9	---	---	---	73
Utah	---	1	---	1	---	2	4
Virginia	761	2,674	416	122	15	---	3,988
Washington	---	---	---	1	---	---	1
West Virginia	147	1,294	193	92	25	---	1,751
Total	1,445	4,778	922	259	44	19	7,467
			PERCENTAGE OF TOTAL				
Kentucky	34.5	44.7	17.5	2.9	0.1	0.3	100.0
Maryland	---	100.0	---	---	---	---	100.0
Ohio	---	86.7	13.3	---	---	---	100.0
Pennsylvania	18.8	46.4	26.6	1.0	1.0	6.2	100.0
Tennessee	11.0	76.7	12.3	---	---	---	100.0
Utah	---	25.0	---	25.0	---	50.0	100.0
Virginia	19.1	67.1	10.4	3.0	.4	---	100.0
Washington	---	---	---	100.0	---	---	100.0
West Virginia	8.4	73.9	11.0	5.3	1.4	---	100.0
Total	19.4	64.0	12.3	3.5	.6	.2	100.0

[1] See table 20 for percentage of tonnage not reported.

Table 24.—Rubber-tired mine car haulage at bituminous coal and lignite underground mines in the United States, 1965, by States [1]

State	Production, by size of mine car reported						
	1 ton	2 tons	3 tons	4–5 tons	6–9 tons	10 tons and over	Total
			NET TONS				
Kentucky	2,796,835	2,443,940	1,388,566	770,977	4,226	3,500	7,408,044
Maryland	---	45,411	---	---	---	---	45,411
Ohio	---	10,843	7,765	---	---	---	18,608
Pennsylvania	21,857	204,992	118,275	---	2,000	---	347,124
Tennessee	5,854	80,034	240,611	---	---	---	326,499
Utah	---	1,802	---	2,462	---	21,548	25,812
Virginia	1,041,925	6,212,219	1,239,191	929,079	72,158	---	9,494,572
Washington	---	---	---	9,601	---	---	9,601
West Virginia	330,064	2,386,442	1,046,937	601,564	777,275	---	5,142,282
Total	4,196,535	11,385,683	4,041,345	2,313,683	855,659	25,048	22,817,953
			PERCENTAGE OF TOTAL				
Kentucky	37.7	33.0	18.7	10.4	0.1	0.1	100.0
Maryland	---	100.0	---	---	---	---	100.0
Ohio	---	58.3	41.7	---	---	---	100.0
Pennsylvania	6.3	59.0	34.1	---	.6	---	100.0
Tennessee	1.8	24.5	73.7	---	---	---	100.0
Utah	---	7.0	---	9.5	---	83.5	100.0
Virginia	11.0	65.4	13.1	9.8	.7	---	100.0
Washington	---	---	---	100.0	---	---	100.0
West Virginia	6.4	46.4	20.4	11.7	15.1	---	100.0
Total	18.4	49.9	17.7	10.1	3.8	.1	100.0

[1] See table 20 for percentage of tonnage not reported.

Table 25.—Number and production of underground bituminous coal and lignite mines using gathering and haulage conveyors, and number and length of units in use in the United States [1]

Year	Number of mines	Production (net tons)	Number of units in use	Average length (feet)	Total length (miles)
1945	117	40,189,857	359	1,438	97.6
1946	161	46,022,710	457	1,484	128.5
1947	199	70,690,920	594	1,470	165.3
1948	270	81,821,361	755	1,460	208.8
1949	314	69,947,713	860	1,514	246.7
1950	374	92,413,644	1,013	1,538	294.9
1951	372	99,643,003	1,094	1,568	325.0
1952	358	92,168,992	1,066	1,526	308.2
1953	322	100,155,249	1,042	1,541	303.9
1954	291	83,211,284	1,081	1,626	332.9
1955	314	97,677,313	1,002	1,682	319.6
1956	314	126,717,518	1,114	1,656	349.4
1957	362	136,914,192	1,233	1,672	390.4
1958	366	115,419,740	1,235	1,711	400.3
1959	371	126,654,911	1,416	1,723	462.1
1960	396	137,053,564	1,566	1,673	499.2
1961	414	140,938,297	1,635	1,655	512.6
1962	430	153,251,478	1,786	1,659	561.2
1963	494	173,999,774	1,998	1,656	626.9
1964	503	194,389,009	2,150	1,598	650.7
1965	553	210,651,555	2,402	1,713	779.3

[1] Include all gathering and haulage conveyors with capacity over 500 feet, except main-slope conveyors. Excludes lignite and Virginia semianthracite mines in 1945–49.

Table 26.—Number and production of underground bituminous coal and lignite mines using gathering and haulage conveyors, and number and length of units in use in the United States, by States [1]

State	Number of mines		Production (net tons)		Number of units in use		Average length (feet)		Total length (miles)	
	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965
Alabama	7	7	5,827,668	6,200,083	65	67	2,247	2,139	27.7	27.1
Colorado	7	6	1,850,781	1,696,344	25	25	1,594	1,638	7.5	7.8
Illinois	17	20	23,094,950	23,772,616	146	157	2,213	2,212	61.2	65.8
Indiana	6	5	2,649,773	1,977,424	19	16	1,363	1,144	4.9	3.5
Kentucky	43	44	19,884,177	23,861,261	199	226	1,489	1,622	56.1	69.4
Maryland	2	4	150,942	221,130	8	10	1,050	940	1.6	1.8
New Mexico	1	1	397,574	421,262	1	1	1,500	1,500	.3	.3
Ohio	15	16	8,194,296	4,101,954	60	66	1,242	1,168	14.1	14.6
Pennsylvania	94	116	31,813,034	35,349,963	477	557	1,468	1,553	132.6	163.8
Tennessee	1	1	30,000	140,000	1	1	1,500	2,000	.3	.4
Utah	20	15	4,080,070	2,914,327	63	47	1,072	1,244	12.8	11.1
Virginia	12	19	8,363,077	11,054,211	93	144	2,178	2,442	38.4	66.6
West Virginia	277	297	88,036,269	98,828,853	990	1,078	1,559	1,693	292.3	345.7
Wyoming	1	2	16,398	112,127	3	7	1,500	1,071	.9	1.4
Total	503	553	194,389,009	210,651,555	2,150	2,402	1,598	1,713	650.7	779.3

[1] Includes all mines using belt conveyors, 500 feet long or more for transporting coal underground. Excludes main-slope conveyors.

Table 27.—Underground mines in the bituminous coal and lignite fields of the United States, 1965, by States and counties

State and county	Number of underground mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama:						
Bibb	2	34,950	27	131	3,555	9.83
Blount	1	1,596	3	100	319	5.00
Cullman	1	4,393	9	100	879	5.00
Jackson	3	13,467	108	60	6,475	2.08
Jefferson	62	6,552,230	3,141	209	656,536	9.98
Marion	33	320,029	302	206	62,142	5.15
Shelby	9	674,751	263	259	68,226	9.89
Tuscaloosa	2	4,933	9	62	574	8.59
Walker	30	2,316,278	652	236	153,906	15.05
Total Alabama	143	9,922,627	4,514	211	952,612	10.42
Arkansas:						
Johnson	W	W	W	W	W	W
Sebastian	W	W	W	W	W	W
Other counties	4	74,295	56	222	12,416	5.98
Total Arkansas	4	74,295	56	222	12,416	5.98
Colorado:						
Delta	5	186,233	154	133	20,465	9.10
Fremont	15	248,936	77	240	18,550	13.42
Garfield	3	6,975	8	221	1,673	4.17
Gunnison	7	304,761	125	207	25,893	11.77
Huerfano	4	48,279	39	210	8,155	5.92
La Plata	5	26,024	20	180	3,565	7.30
Las Animas	9	871,061	439	248	108,883	8.00
Mesa	6	113,390	45	198	8,985	12.62
Moffat	W	W	W	W	W	W
Pitkin	W	W	W	W	W	W
Rio Blanco	3	6,110	6	168	1,059	5.77
Routt	W	W	W	W	W	W
Weld	6	704,425	265	178	47,087	14.96
Other counties	9	1,004,135	278	228	63,368	15.85
Total Colorado	72	3,520,329	1,456	211	307,683	11.44
Illinois:						
Christian	W	W	W	W	W	W
Douglas	W	W	W	W	W	W
Franklin	W	W	W	W	W	W
Gallatin	3	45,185	51	129	6,587	6.86
Henry	W	W	W	W	W	W
Jackson	W	W	W	W	W	W
Jefferson	W	W	W	W	W	W
Logan	1	15,882	23	123	2,821	5.63
Macoupin	1	378,979	156	224	34,833	10.88
Menard	W	W	W	W	W	W
Mercer	1	23,685	14	170	2,457	9.64
Montgomery	W	W	W	W	W	W
Peoria	1	15,454	8	188	1,505	10.27
Randolph	W	W	W	W	W	W
St. Clair	W	W	W	W	W	W
Saline	3	1,894,759	377	220	82,922	22.85
Vermilion	3	46,479	33	185	6,108	7.61
Washington	W	W	W	W	W	W
Williamson	10	3,604,619	909	234	212,662	16.95
Other counties	18	19,788,583	3,601	244	880,377	22.48
Total Illinois	41	25,813,625	5,172	238	1,230,272	20.98
Indiana:						
Dubois	W	W	W	W	W	W
Gibson	W	W	W	W	W	W
Greene	1	2,300	5	66	330	6.96
Knox	W	W	W	W	W	W
Pike	3	71,828	30	222	6,732	10.67
Sullivan	5	1,394,885	462	154	71,095	19.62
Vermillion	2	10,491	42	50	2,098	5.00
Vigo	W	W	W	W	W	W
Warrick	4	205,576	186	98	18,193	11.30
Other counties	5	670,227	362	183	66,117	10.14
Total Indiana	20	2,355,307	1,087	151	164,565	14.31

See footnotes at end of table.

Table 27.—Underground mines in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of underground mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Iowa:						
Appanoose	6	23,335	71	125	8,906	2.62
Lucas	1	60,158	22	275	6,016	10.00
Marion	1	6,421	5	200	1,003	6.40
Monroe	1	106,570	17	275	4,678	22.78
Total Iowa	9	196,484	115	179	20,603	9.54
Kentucky, Eastern:						
Bell	49	664,633	754	156	117,634	5.65
Breathitt	4	113,093	104	138	14,297	7.91
Carter	2	19,155	22	211	4,695	4.08
Clay	56	1,381,819	896	186	166,685	8.29
Clinton	2	11,500	12	188	2,309	4.98
Elliott	4	8,251	32	54	1,741	4.74
Floyd	219	4,575,318	2,568	185	475,111	9.63
Harlan	110	4,824,155	1,996	208	415,160	11.62
Jackson	7	21,581	58	66	3,806	5.67
Johnson	42	212,592	256	144	36,844	5.77
Knott	103	1,640,318	656	182	119,470	13.73
Knox	41	131,464	212	122	25,828	5.09
Laurel	1	3,360	13	50	672	5.00
Lawrence	2	2,800	9	56	523	5.35
Lee	2	23,900	33	181	6,005	3.98
Leslie	30	1,465,646	926	191	176,797	8.29
Letcher	196	4,883,166	1,548	221	342,198	14.27
McCreary	7	466,532	250	206	51,550	9.05
Magoffin	5	62,333	119	75	8,905	7.00
Martin	9	365,680	147	155	22,755	16.07
Morgan	1	6,000	8	160	1,282	4.68
Owsley	1	3,500	7	100	700	5.00
Perry	70	2,351,451	967	206	199,107	11.81
Pike	527	13,413,177	6,553	172	1,127,158	11.90
Pulaski	8	156,574	71	183	12,961	12.08
Wayne	1	1,384	3	100	346	4.00
Whitley	48	465,734	478	171	81,708	5.70
Wolfe	1	4,000	8	100	800	5.00
Total Eastern Kentucky	1,548	37,279,116	18,706	183	3,417,047	10.91
Kentucky, Western:						
Butler	3	92,000	48	200	9,573	9.61
Christian	1	17,424	25	100	2,489	7.00
Daviess	2	16,146	8	160	1,292	12.50
Henderson	6	154,901	75	177	13,239	11.70
Hopkins	15	5,958,530	1,469	183	268,887	22.16
Muhlenberg	7	1,523,911	394	197	77,711	19.61
Ohio	7	746,224	84	253	21,315	35.01
Union	4	4,887,824	805	244	196,298	24.90
Webster	1	12,158	14	139	1,948	6.24
Total Western Kentucky	46	13,409,118	2,922	203	592,752	22.62
Total Kentucky	1,594	50,688,234	21,628	185	4,009,799	12.64
Maryland:						
Allegany	16	108,888	98	170	16,650	6.54
Garrett	16	326,213	144	210	30,317	10.76
Total Maryland	32	435,101	242	194	46,967	9.26
Missouri:						
Adair	W	W	W	W	W	W
Putnam	W	W	W	W	W	W
Other counties	3	25,701	46	161	7,385	3.48
Total Missouri	3	25,701	46	161	7,385	3.48
Montana (bituminous):						
Blaine	W	W	W	W	W	W
Carbon	W	W	W	W	W	W
Musselshell	6	32,230	25	173	4,303	7.49
Other counties	2	28,814	36	162	5,817	4.95
Total Montana (bituminous)	8	61,044	61	166	10,120	6.03

See footnotes at end of table.

Table 27.—Underground mines in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of underground mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Montana (lignite):						
Custer	(1)	(1)	(1)	(1)	(1)	(1)
Powder River	(1)	(1)	(1)	(1)	(1)	(1)
Total Montana (lignite)	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico:						
Colfax	(1)	(1)	(1)	(1)	(1)	(1)
McKinley	(1)	(1)	(1)	(1)	(1)	(1)
San Juan	(1)	(1)	(1)	(1)	(1)	(1)
Total New Mexico [1]	[1] 15	[1] 498,334	[1] 220	[1] 189	[1] 41,546	[1] 11.99
North Dakota (lignite): Williams	1	1,341	2	69	164	8.19
Ohio:						
Athens	9	111,325	94	189	17,755	6.27
Belmont	9	4,336,815	1,251	215	268,866	16.13
Carroll	1	3,162	7	176	1,216	2.60
Columbiana	3	24,264	21	214	4,552	5.33
Coshocton	5	384,587	88	229	20,188	19.05
Gallia	12	59,296	43	163	6,943	8.54
Guernsey	1	1,082	11	50	541	2.00
Harrison	6	4,390,885	1,544	237	365,907	12.00
Hocking	W	W	W	W	W	W
Holmes	1	1,917	4	228	913	2.10
Jackson	6	47,129	31	192	5,891	8.00
Jefferson	8	853,955	254	235	59,592	14.33
Meigs	8	22,100	46	101	4,614	4.79
Morgan	1	1,023	2	150	305	3.35
Muskingum	5	67,941	53	224	11,983	5.67
Perry	W	W	W	W	W	W
Tuscarawas	9	572,313	178	230	40,850	14.01
Vinton	3	17,773	17	164	2,799	6.35
Other counties	6	372,014	65	218	14,202	26.19
Total Ohio	93	11,267,581	3,709	223	827,117	13.61
Oklahoma: La Flore	3	8,832	19	103	1,945	4.54
Pennsylvania:						
Allegheny	14	3,933,427	1,175	226	265,593	14.81
Armstrong	42	3,324,770	839	236	198,021	16.79
Beaver	W	W	W	W	W	W
Bedford	9	198,523	92	220	20,155	9.85
Blair	2	5,484	11	152	1,667	3.29
Butler	12	453,068	132	242	32,064	14.13
Cambria	75	7,915,500	3,367	237	797,933	9.92
Centre	8	49,721	89	141	12,556	3.96
Clarion	7	57,803	29	180	5,161	11.20
Clearfield	51	1,086,680	504	221	111,340	9.76
Clinton	1	1,680	6	65	361	4.65
Elk	12	138,050	71	249	17,586	7.85
Fayette	24	757,825	468	247	115,698	6.55
Greene	29	12,259,227	3,602	236	850,154	14.42
Huntingdon	5	8,056	14	153	2,148	3.75
Indiana	63	5,843,260	1,754	218	382,412	15.28
Jefferson	22	778,258	287	206	59,138	13.16
Lawrence	W	W	W	W	W	W
Somerset	63	1,354,624	963	164	157,882	8.58
Tioga	1	5,538	3	254	763	7.26
Venango	W	W	W	W	W	W
Washington	19	13,528,582	3,819	245	935,587	14.46
Westmoreland	31	3,877,673	1,154	215	248,092	15.63
Other counties	4	97,151	136	222	30,256	3.21
Total Pennsylvania	494	55,674,900	18,515	229	4,244,567	13.12
Tennessee:						
Anderson	27	1,475,620	440	209	91,996	16.04
Bledsoe	3	11,569	12	200	2,314	5.00
Campbell	24	372,835	345	131	45,192	8.25
Claiborne	14	122,945	136	142	19,331	6.36
Cumberland	1	4,000	14	108	1,544	2.59
Fentress	12	58,560	46	214	9,859	5.94

See footnotes at end of table.

Table 27.—Underground mines in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of underground mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Tennessee: Continued						
Grundy	1	1,035	2	180	361	2.87
Hamilton	5	34,350	115	100	11,450	3.00
Marion	31	579,065	237	201	47,660	12.15
Morgan	13	177,187	148	239	35,437	5.00
Overton	6	25,759	16	209	3,444	7.48
Pickett	1	3,024	8	75	605	5.00
Putnam	2	219,612	98	150	14,641	15.00
Rhea	3	24,000	48	100	4,800	5.00
Scott	17	411,236	153	181	27,674	14.86
Sequatchi	17	53,524	74	123	9,057	5.91
Van Buren	3	6,813	14	100	1,363	5.00
Total Tennessee	180	3,581,134	1,906	171	326,728	10.96
Utah:						
Carbon	18	3,779,041	1,122	210	235,601	16.04
Emery	7	1,100,714	338	223	75,391	14.60
Iron	3	36,101	20	154	3,036	11.89
Kane	W	W	W	W	W	W
Sevier	W	W	W	W	W	W
Summit	1	12,918	6	213	1,219	10.60
Other counties	2	63,229	9	204	1,839	34.38
Total Utah	31	4,992,003	1,495	212	317,086	15.74
Virginia:						
Buchanan	762	14,055,007	6,723	202	1,357,972	10.35
Dickenson	112	7,980,851	1,741	231	402,261	19.84
Lee	64	467,413	428	181	77,386	6.04
Montgomery	W	W	W	W	W	W
Russell	41	1,734,480	582	218	126,789	13.68
Scott	W	W	W	W	W	W
Tazewell	11	177,836	154	211	32,393	5.49
Wise	160	4,939,788	1,399	220	307,775	16.05
Other counties	3	9,814	32	103	3,287	2.99
Total Virginia	1,153	29,365,189	11,059	209	2,307,863	12.72
Washington:						
King	W	W	W	W	W	W
Thurston	W	W	W	W	W	W
Other counties	4	52,100	54	143	7,721	6.75
Total Washington	4	52,100	54	143	7,721	6.75
West Virginia:						
Barbour	32	1,878,081	607	232	140,891	13.33
Boone	62	6,273,211	1,900	190	360,944	17.38
Braxton	W	W	W	W	W	W
Brooke	4	588,453	183	226	41,324	14.24
Clay	6	54,931	41	188	7,629	7.20
Fayette	125	5,403,824	2,217	219	485,519	11.13
Gilmer	7	861,252	244	235	57,264	15.04
Grant	W	W	W	W	W	W
Greenbrier	66	962,260	438	219	95,938	10.03
Harrison	43	6,688,639	1,434	236	338,494	19.76
Kanawha	85	9,839,267	2,413	219	528,425	18.62
Lewis	2	10,623	13	227	3,026	3.51
Logan	62	15,526,399	4,642	231	1,072,265	14.48
Marion	10	14,072,924	2,863	266	761,522	18.48
Marshall	3	2,585,281	546	235	128,238	20.16
Mason	9	303,723	154	216	33,266	9.13
McDowell	244	16,320,454	4,863	237	1,152,574	14.16
Mercer	31	1,115,360	341	228	77,725	14.35
Mineral	W	W	W	W	W	W
Mingo	77	5,377,492	1,502	215	322,972	16.65
Monongalia	45	8,787,175	1,686	267	450,163	19.52
Nicholas	85	7,718,394	2,389	239	570,887	13.52
Ohio	W	W	W	W	W	W
Pocahontas	4	91,289	22	162	3,555	25.68
Preston	80	2,512,814	1,045	203	212,231	11.84
Raleigh	107	8,683,533	2,993	244	730,322	11.89
Randolph	23	902,621	464	191	88,666	10.18
Taylor	19	137,316	112	160	17,997	7.63

See footnotes at end of table.

Table 27.—Underground mines in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of underground mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
West Virginia: Continued						
Tucker	1	65,354	24	245	5,990	10.91
Upshur	17	429,502	170	187	31,768	13.52
Wayne	6	39,049	98	100	9,762	4.00
Webster	31	609,425	346	157	54,316	11.22
Wyoming	84	13,417,433	3,872	247	956,339	14.03
Other counties	13	2,808,202	739	235	173,920	16.15
Total West Virginia	1,383	134,064,281	38,361	232	8,913,932	15.04
Wyoming:						
Hot Springs	W	W	W	W	W	W
Sweetwater	W	W	W	W	W	W
Other counties	5	123,838	79	179	14,109	8.78
Total Wyoming	5	123,838	79	179	14,109	8.78
Total United States	5,280	332,661,236	109,735	216	23,755,080	14.00

W Withheld to avoid disclosing individual company data; included with "Other counties."
[1] To avoid disclosing individual operatons Montana (lignite) and New Mexico are combined.

machines decreased from 71 to 45 percent of the underground production, while the percentage from continuous mining machines increased from 8 to 43 percent during the last 10-year period. In 1965, 142 million tons of bituminous coal was produced at 447 mines by continuous mining machines, whereas in 1964, 125 million tons were produced at 361 mines. In 1965, 275 mines, compared with 219 mines in 1964, used continuous mining machines exclusively.

Longwall mining began in November 1951, on a 340-foot face in the Pocahontas No. 4 seam in Raleigh County, W. Va. Production from longwall mining to date has not been large, and as a result separate figures begin with 1963 when 816,003 tons were mined by this method. Longwall mining was practiced in three States (Illinois, Utah, and West Virginia) in 1964 and it was started in Pennsylvania in 1965. Production from longwall mining increased to 1,450,629 and 1,582,250 tons in 1964 and 1965, respectively.

MECHANICAL CLEANING

Mechanical cleaning means cleaning raw coal with mechanical devices that separate out impurities, usually by differences in specific gravity, and does not include coal that is screened only.

The significant growth in mechanical cleaning in recent years generally has paralleled the growth in mechanical loading which, since the decline of hand-picking and other selectivity, has substantially increased the percentage of inert material brought to the surface.

Mechanical devices are divided into two general classes—wet and pneumatic. About 92 percent of the coal cleaned in 1965 was cleaned by wet methods. All coal mechanically cleaned in 1965 has been classified into seven types. The percentages of total production cleaned were as follows: Jigs, 46; dense-medium processes, 28; concentrating tables, 13; pneumatic cleaning, 8; and flotation, launders, and classifiers, the remaining 5 percent. Magnetite and sand were most commonly used as mediums in cleaning bituminous coal by the dense-medium processes. Magnetite was used in cleaning 61 million tons, and sand was used in cleaning 31 million tons.

Although mechanical cleaning by froth flotation has been in use at bituminous coal mines in the United States since 1930, it was not until 1960 that the tonnage cleaned by this method was large enough to be listed separately. Bituminous coal cleaned by froth flotation increased from 1,826,000 tons in 1960 to 6,853,000 tons in 1965.

Table 28.—Growth of strip mining at bituminous coal and lignite mines in the United States, compared with underground and auger mining

Year	Production (thousand net tons)				Percentage of total mined by stripping	Average tons per man per day				Average value per ton f.o.b. mine				Number of strip mines	Number of power shovels and draglines
	Underground mines	Strip mines [1]	Auger mines	Total		Underground mines	Strip mines [1]	Auger mines	Total	Underground mines	Strip mines [1]	Auger mines	Total		
1914	421,423	1,281	----	422,704	0.3	3.71	5.06	----	3.71	NA	NA	----	$1.17	[2] 35	48
1915	439,792	2,832	----	442,624	.6	3.90	5.81	----	3.91	$1.13	$1.18	----	1.13	[2] 60	87
1916	498,587	3,933	----	502,520	.8	3.88	6.67	----	3.90	1.32	1.51	----	1.32	[2] 79	111
1917	546,001	5,790	----	551,791	1.0	3.75	6.52	----	3.77	2.26	2.34	----	2.26	[2] 126	182
1918	571,098	8,288	----	579,386	1.4	3.76	6.81	----	3.78	2.58	2.54	----	2.58	[2] 165	276
1919	460,225	5,635	----	465,860	1.2	3.82	6.21	----	3.84	2.49	2.33	----	2.49	[2] 168	287
1920	559,807	8,860	----	568,667	1.5	3.97	7.20	----	4.00	3.74	4.12	----	3.75	[2] 174	312
1921	410,865	5,057	----	415,922	1.2	4.18	8.28	----	4.20	2.89	2.87	----	2.89	[2] 155	279
1922	412,059	10,209	----	422,268	2.4	4.24	8.09	----	4.28	3.02	3.07	----	3.02	272	379
1923	552,625	11,940	----	564,565	2.1	4.43	9.32	----	4.47	2.69	2.31	----	2.68	263	442
1924	470,080	13,607	----	483,687	2.8	4.50	9.91	----	4.56	2.20	2.00	----	2.20	234	420
1925	503,182	16,871	----	520,053	3.2	4.45	11.18	----	4.52	2.05	1.84	----	2.04	227	389
1926	556,444	16,923	----	573,367	3.0	4.42	11.13	----	4.50	2.07	1.89	----	2.06	237	410
1927	499,385	18,378	----	517,763	3.6	4.47	11.06	----	4.55	1.99	1.90	----	1.99	255	455
1928	480,956	19,789	----	500,745	4.0	4.61	13.02	----	4.73	1.87	1.69	----	1.86	250	415
1929	514,721	20,268	----	534,989	3.8	4.73	14.08	----	4.85	1.79	1.57	----	1.78	200	411
1930	447,684	19,842	----	467,526	4.3	4.93	16.21	----	5.06	1.71	1.54	----	1.70	218	341
1931	363,157	18,932	----	382,089	5.0	5.12	17.68	----	5.30	1.54	1.51	----	1.54	235	314
1932	290,069	19,641	----	309,710	6.3	4.99	16.95	----	5.22	1.31	1.32	----	1.31	255	332
1933	315,360	18,270	----	333,630	5.5	4.60	13.59	----	4.78	1.34	1.33	----	1.34	289	389
1934	338,578	20,790	----	359,368	5.8	4.23	13.28	----	4.40	1.76	1.49	----	1.75	344	458
1935	348,726	23,647	----	372,373	6.4	4.32	12.01	----	4.50	1.79	1.47	----	1.77	368	507
1936	410,962	28,126	----	439,088	6.4	4.42	13.91	----	4.62	1.77	1.49	----	1.76	381	562
1937	413,780	31,751	----	445,531	7.1	NA	NA	----	4.69	NA	NA	----	1.94	449	NA
1938	318,138	30,407	----	348,545	8.7	4.60	15.00	----	4.89	NA	NA	----	1.95	465	737
1939	357,133	37,722	----	394,855	9.6	4.92	14.68	----	5.25	1.88	1.49	----	1.84	537	914
1940	417,604	43,167	----	460,771	9.4	4.86	15.63	----	5.19	1.94	1.56	----	1.91	638	1,071
1941	459,078	55,071	----	514,149	10.7	4.83	15.59	----	5.20	2.23	1.79	----	2.19	769	1,321
1942	515,490	67,203	----	582,693	11.5	4.74	15.52	----	5.12	2.41	1.90	----	2.36	834	1,438
1943	510,492	79,685	----	590,177	13.5	4.89	15.15	----	5.38	2.75	2.28	----	2.69	1,004	1,839
1944	518,678	100,898	----	619,576	16.3	5.04	15.89	----	5.67	3.01	2.48	----	2.92	1,240	2,312
1945	467,630	109,987	----	577,617	19.0	5.04	15.46	----	5.78	3.16	2.65	----	3.06	1,370	2,439
1946	420,958	112,964	----	533,922	21.1	5.43	15.73	----	6.30	3.59	2.87	----	3.44	1,445	2,744
1947	491,229	139,395	----	630,624	22.1	5.49	15.93	----	6.42	4.35	3.47	----	4.16	1,750	3,254
1948	460,012	139,506	----	599,518	23.3	5.31	15.28	----	6.26	5.26	4.11	----	4.99	1,971	3,712
1949	331,823	106,045	----	437,868	24.2	5.42	15.33	----	6.43	5.18	3.94	----	4.88	1,761	3,576

1950	392,844	123,467	----	516,311	23.9	5.75	15.66	----	6.77	5.15	3.87	----	4.84	1,870	3,877
1951	415,842	117,618	205	533,665	22.0	6.08	16.02	----	7.04	5.21	3.88	----	4.92	1,784	3,810
1952	356,425	108,910	1,506	466,841	23.3	6.37	16.77	20.07	7.47	5.24	3.81	$4.31	4.90	1,643	3,527
1953	349,551	105,448	2,291	457,290	23.1	7.01	17.62	25.30	8.17	5.27	3.75	4.15	4.92	1,554	3,390
1954	289,112	98,134	4,460	391,706	25.1	7.99	19.64	24.12	9.47	4.87	3.52	3.41	4.52	1,329	3,409
1955	343,465	115,093	6,075	464,633	24.8	8.28	21.12	22.22	9.84	4.86	3.48	3.60	4.50	1,617	3,265
1956	365,774	127,055	8,045	500,874	25.4	8.62	21.18	24.85	10.28	5.20	3.74	4.17	4.82	1,728	3,705
1957	360,649	124,109	7,946	492,704	25.2	8.91	21.64	26.19	10.59	5.52	3.89	4.12	5.08	1,756	3,723
1958	286,884	116,242	7,320	410,446	28.3	9.38	21.54	28.15	11.33	5.33	3.80	3.60	4.86	1,646	3,515
1959	283,434	120,953	7,641	412,028	29.4	10.08	22.65	28.77	12.22	5.23	3.76	3.83	4.77	1,594	3,417
1960	284,888	122,630	7,994	415,512	29.5	10.64	22.93	31.36	12.83	5.14	3.74	3.37	4.69	1,530	3,313
1961	272,766	121,979	8,232	402,977	30.3	11.41	25.00	30.61	13.87	5.02	3.67	3.24	4.58	1,477	3,204
1962	281,266	130,300	10,583	422,149	30.9	11.97	26.76	34.61	14.72	4.91	3.64	3.33	4.48	1,429	3,185
1963	302,256	144,141	12,531	458,928	31.4	12.78	28.69	38.87	15.83	4.82	3.57	3.25	4.39	1,431	3,254
1964	321,808	151,859	13,331	486,998	31.2	13.74	29.29	42.63	16.84	4.92	3.55	3.35	4.45	1,455	3,192
1965	332,661	165,241	14,186	512,088	32.3	14.00	31.98	45.85	17.52	4.93	3.57	3.36	4.44	1,541	3,122

NA Not available.

[1] Includes power strip pits proper and excludes horse stripping operations and mines combining stripping and underground in the same operation for the period 1914–42. The years 1943–65 include data on all strip mines.

[2] Exclusive of horse stripping operations.

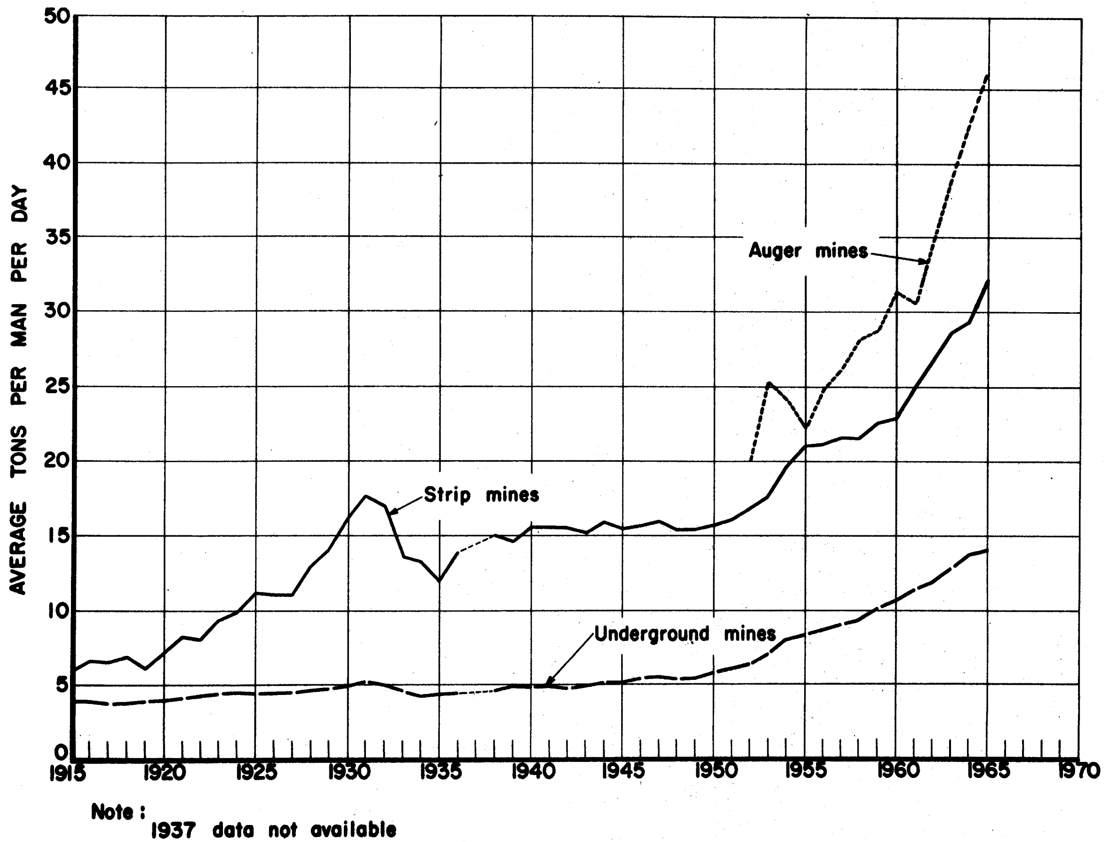

Figure 8.—Average tons per man per day at bituminous coal and lignite mines in the United States, 1915–65, by underground, strip, and auger mines.

Table 29.—Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment in use in the United States

Year	Number of strip mines	Production (thousand net tons)	Number of power shovels and dragline excavators												Number of carry-all scrapers	Number of bull-dozers
			By type of power					By capacity of dipper or bucket, cubic yards				By type of machine		Total		
			Electric	Diesel-electric	Diesel	Gasoline	Steam	Less than 3	3–5	6–12	More than 12	Power shovels	Dragline excavators			
1932	255	19,641	[1] 105	(2)	[3] 61	(4)	166	NA	NA	NA	NA	NA	NA	332	NA	NA
1933	289	18,270	[1] 117	(2)	[3] 103	(4)	169	NA	NA	NA	NA	NA	NA	389	NA	NA
1934	344	20,790	[1] 121	(2)	[3] 149	(4)	188	NA	NA	NA	NA	NA	NA	458	NA	NA
1935	368	23,647	[1] 139	(2)	[3] 194	(4)	174	NA	NA	NA	NA	NA	NA	507	NA	NA
1936	381	28,126	[1] 151	(2)	[3] 223	(4)	188	NA	NA	NA	NA	NA	NA	562	NA	NA
1937	449	31,751	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1938	465	30,407	[1] 155	(2)	[3] 440	(4)	142	NA	NA	NA	NA	NA	NA	737	NA	NA
1939	537	37,722	[1] 184	(2)	[3] 524	(4)	206	NA	NA	NA	NA	NA	NA	914	NA	NA
1940	638	43,167	[1] 194	(2)	[3] 697	(4)	180	NA	NA	NA	NA	NA	NA	1,071	NA	NA
1941	769	55,071	[1] 210	(2)	[3] 911	(4)	200	1,009	153	95	64	NA	NA	1,321	NA	NA
1942	834	67,203	[1] 219	(2)	[3] 1,020	(4)	199	1,114	159	97	68	NA	NA	1,438	NA	NA
1943	1,004	79,685	[1] 234	(2)	[3] 1,433	(4)	172	1,488	173	106	72	NA	NA	1,839	NA	NA
1944	1,240	100,898	[1] 244	(2)	[3] 1,902	(4)	166	1,900	225	113	74	NA	NA	2,312	NA	NA
1945	1,370	109,987	[1] 256	(2)	[3] 2,042	(4)	141	2,004	243	117	75	NA	NA	2,439	NA	NA
1946	1,445	112,964	[1] 261	(2)	1,619	753	111	2,256	302	112	74	2,406	338	2,744	263	NA
1947	1,750	139,395	[1] 301	(2)	2,279	591	83	2,685	362	123	84	2,822	432	3,254	275	NA
1948	1,971	139,506	[1] 337	(2)	2,675	646	54	3,048	446	130	88	3,177	535	3,712	362	NA
1949	1,761	106,045	[1] 352	(2)	2,646	527	51	2,931	367	168	110	3,011	565	3,576	320	NA
1950	1,870	123,467	[1] 348	(2)	2,880	607	42	3,182	416	170	109	3,247	630	3,877	286	NA
1951	1,784	117,618	[1] 346	(2)	2,905	533	26	3,088	420	187	115	3,164	646	3,810	220	NA
1952	1,643	108,910	[1] 321	(2)	2,642	545	19	2,800	425	183	119	2,892	635	3,527	218	NA
1953	1,554	105,448	[1] 317	(2)	2,629	446	17	2,692	413	193	111	2,793	616	3,409	244	1,954
1954	1,329	98,134	[1] 381	(2)	2,617	374	18	2,480	579	211	120	2,605	785	3,390	269	2,599
1955	1,617	115,093	[1] 315	(2)	2,603	337	10	2,381	550	223	111	2,592	673	3,265	187	2,106
1956	1,728	127,055	285	136	2,914	365	5	2,693	634	249	129	2,899	806	3,705	226	2,381
1957	1,756	124,109	325	164	2,839	389	6	2,748	566	266	143	2,894	829	3,723	215	2,499
1958	1,646	116,242	315	273	2,607	315	5	2,507	591	275	142	2,704	811	3,515	173	2,472
1959	1,594	120,953	309	215	2,579	307	7	2,435	572	267	143	2,607	810	3,417	161	2,443
1960	1,530	122,630	311	194	2,519	285	4	2,315	588	265	145	2,521	792	3,313	163	2,345
1961	1,477	121,979	286	210	2,455	253	(5)	2,162	606	299	137	2,412	792	3,204	152	2,341
1962	1,429	130,300	296	214	2,423	252	(5)	2,111	597	335	142	2,353	832	3,185	146	2,330
1963	1,431	144,141	304	213	2,503	234	(5)	2,101	627	372	154	2,409	845	3,254	163	2,430
1964	1,455	151,859	315	146	2,540	191	(5)	2,045	599	381	167	2,352	840	3,192	148	2,441
1965	1,541	165,241	322	105	2,508	187	(5)	1,952	576	413	181	2,256	866	3,122	121	2,428

NA Not available.
[1] Includes diesel-electric shovels.
[2] Included with electric shovels.
[3] Includes gasoline shovels.
[4] Included with diesel shovels.
[5] Canvass discontinued.

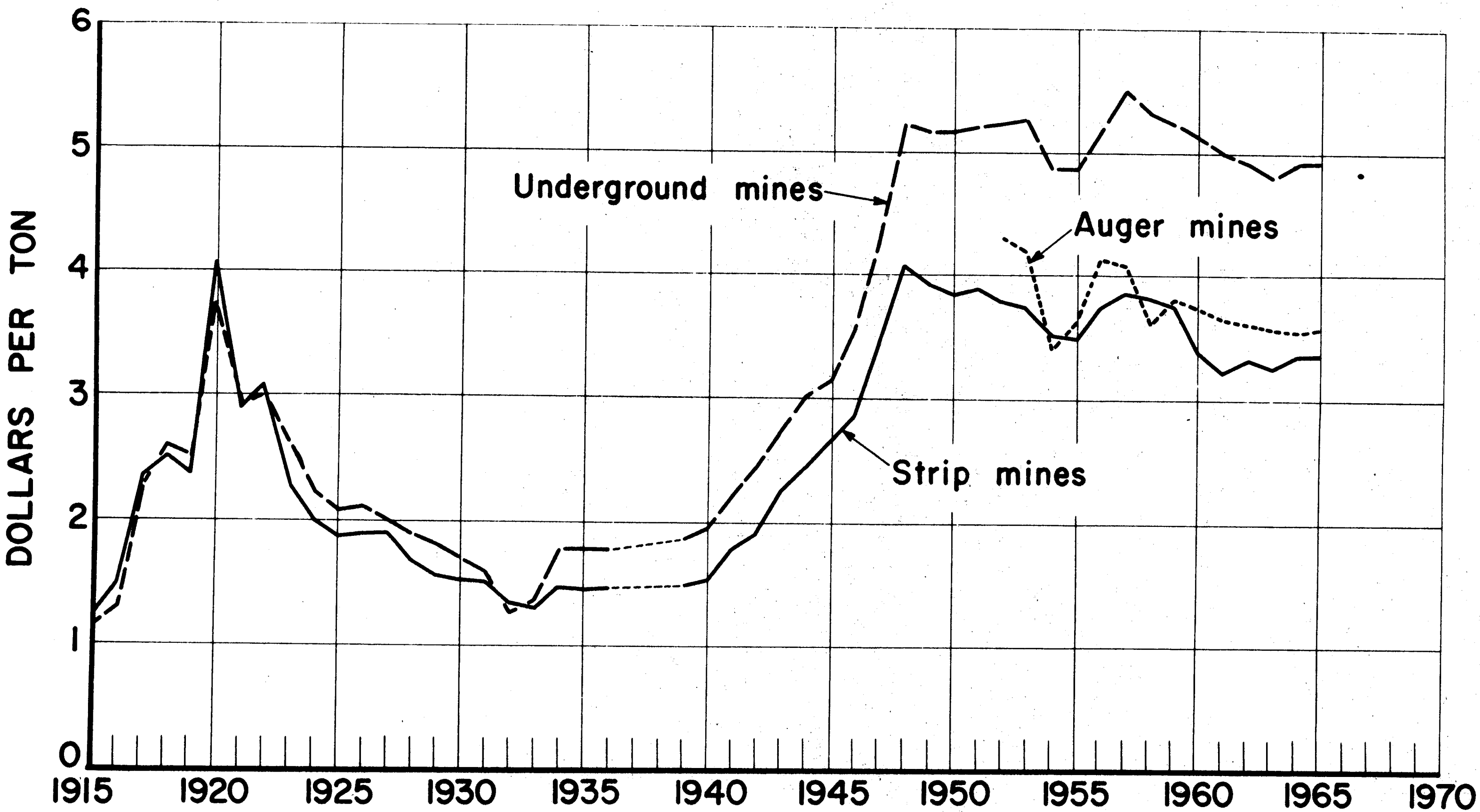

Figure 9.—Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, 1915–65, by underground, strip, and auger mines.

Table 30.—Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment in use in the United States, 1965, by States

State	Number of strip mines	Production (net tons)	Number of power shovels and dragline excavators: By type of power: Electric	Diesel electric	Diesel	Gasoline	By capacity of dipper or bucket, cubic yards: Less than 3	3–5	6–12	More than 12	By type of machine: Power shovels	Dragline excavators	Total	Number of carryall scrapers	Number of bulldozers
Alabama	58	4,808,844	8	1	87	14	71	16	18	5	81	29	110	4	92
Alaska	4	893,182	---	---	9	---	4	5	---	---	9	---	9	3	16
Arkansas	4	151,593	---	1	7	---	5	1	2	---	3	5	8	---	6
Colorado	7	1,270,129	7	2	7	---	4	4	6	2	8	8	16	2	15
Illinois	49	32,669,583	97	6	56	2	20	31	53	57	99	62	161	---	114
Indiana	41	13,210,102	43	3	42	13	35	20	26	20	59	42	101	---	91
Iowa	19	846,758	1	---	31	7	26	10	3	---	20	19	39	4	32
Kansas	6	1,309,744	8	4	5	---	7	2	4	4	10	7	17	---	8
Kentucky:															
Eastern	73	4,409,530	---	---	92	4	67	18	11	---	92	4	96	2	94
Western	43	25,733,069	47	4	59	6	39	20	30	27	88	28	116	---	126
Total Kentucky	116	30,142,599	47	4	151	10	106	38	41	27	180	32	212	2	220
Maryland	35	736,841	---	1	55	3	49	9	1	---	46	13	59	---	31
Missouri	13	3,538,042	10	4	9	11	20	4	4	6	22	12	34	6	33
Montana:															
Bituminous	2	2,144	3	---	---	1	---	1	---	3	3	1	4	---	---
Lignite	1	298,315	1	---	1	---	---	1	1	---	1	1	2	2	1
Total Montana	3	300,459	4	---	1	1	---	2	1	3	4	2	6	2	1
New Mexico	3	2,777,593	5	---	2	---	1	---	3	3	6	1	7	1	6
North Dakota (lignite)	28	2,730,594	23	4	15	10	24	17	9	2	40	12	52	28	42
Ohio	264	26,364,829	43	23	495	33	370	129	67	28	425	169	594	35	482
Oklahoma	11	964,061	6	6	10	---	8	7	3	4	10	12	22	1	14
Pennsylvania	581	23,767,438	12	36	1,046	68	791	211	144	16	766	396	1,162	8	762
South Dakota (lignite)	1	10,000	---	---	2	---	1	1	---	---	1	1	2	1	1
Tennessee	41	2,066,777	---	---	81	1	67	9	6	---	73	9	82	---	59
Virginia	56	3,080,742	---	4	81	3	77	10	1	---	86	2	88	6	109
Washington	1	2,658	---	---	1	---	1	---	---	---	1	---	1	---	1
West Virginia	191	10,462,246	2	5	306	8	254	46	18	3	292	29	321	7	278
Wyoming	9	3,135,955	6	1	9	3	11	4	3	1	15	4	19	11	15
Total	1,541	165,240,769	322	105	2,508	187	1,952	576	413	181	2,256	866	3,122	121	2,428

Table 31.—Bituminous coal lignite strip mines using power drills in bank or overburden in the United States

Year	Number of mines	Production		Number of power drills		
		Quantity (net tons)	Percentage of total	Horizontal	Vertical	Total
1946	514	75,375,841	66.7	NA	NA	764
1947	598	95,915,346	68.8	NA	NA	875
1948	728	98,809,393	72.3	NA	NA	1,195
1949	756	78,146,655	73.7	NA	NA	1,256
1950	692	87,205,280	70.6	NA	NA	1,201
1951	650	85,331,204	72.5	737	388	1,125
1952	629	79,252,284	73.0	685	385	1,070
1953	603	80,259,365	76.1	639	409	1,048
1954	541	70,107,205	71.4	592	391	983
1955	564	85,623,050	74.4	582	371	953
1956	696	96,278,779	75.8	652	389	1,041
1957	722	96,418,089	77.7	640	464	1,104
1958	737	91,659,662	78.9	615	464	1,079
1959	697	95,716,153	79.1	580	487	1,067
1960	714	96,660,466	78.8	551	498	1,049
1961	650	92,135,940	75.5	495	449	944
1962	636	100,901,554	77.4	456	461	917
1963	613	108,424,525	75.2	414	459	873
1964	677	119,312,811	78.6	395	504	899
1965	734	129,504,535	78.4	381	537	918

NA Not available.

THERMAL DRYING

Because most of the bituminous coal and lignite produced in the United States is either sprayed with water underground to reduce the dust in mining, cleaned by wet methods, or subjected to wet screening in the tipple, the problem of removing surface moisture is vital. The moisture must be removed for any or all of the following reasons: (1) To avoid freezing difficulties and to facilitate handling the coal during shipment and transfer to the firebox; (2) to reduce the heat wasted in evaporation of surface moisture on the coal, thus increasing efficiency in burning; (3) to decrease transportation costs; (4) to improve the coal so that it may be used for specific purposes, such as producing coke and briquets; and (5) to facilitate pneumatic cleaning.

Removal of surface water from fine coal usually presents an individual problem at each preparation plant. Fine coal has a greater surface area per unit weight than coarse coal; therefore, its capacity for retaining moisture is proportionately greater. Removing water from coarse coal is relatively easy, but the problem is greater with coal that is 10 mesh or finer.[4]

[4] Lyons, Orville R. Dewatering and Thermal Drying. Ch. in Coal Preparation. AIME, 2d. ed., 1950, pp. 648–715.

The two components of the total moisture content of wetwashed coal are inherent moisture and surface moisture. Inherent moisture is present in the coal in the bed. Surface moisture is attached to the surface of the coal particles or retained in cracks and fissures other than capillary openings in the coal substance.

There are two principal methods of removing surface moisture from coal; mechanical dewatering, and thermal drying. Thermal drying is generally used on coals that cannot be readily dried by mechanical means such as screens, centrifuges, filters, thickeners, cyclones, and others.

The annual reports of bituminous coal and lignite producers to the Bureau of Mines for 1957 included, for the first time, data on thermal drying. These and succeeding reports have included data on thermal drying only at the preparation plant, and have not included thermal drying at powerplants or other industrial plants.

Thermal driers have been divided into seven groups: (1) Continuous-carrier, (2) fluidized bed, (3) multilouver, (4) rotary, (5) screen, (6) suspension or flash, and (7) vertical tray and cascade.

Each type of thermal drier has been designed to handle a definite range of sizes of

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Table 32.—Bituminous coal and lignite strip mines using power drills in bank or overburden in the United States, by States

State	Number of mines		Production				Number of power drills					
			Quantity (net tons)		Percentage of total strip production		Horizontal		Vertical		Total	
	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965
Alabama	27	35	2,515,868	3,901,443	64.9	81.1	10	9	24	34	34	43
Alaska	5	4	504,569	573,865	67.7	64.2	3	2	4	3	7	5
Arkansas	5	3	132,988	145,612	96.1	96.1	1	1	4	2	5	3
Colorado	5	6	921,921	1,264,153	97.5	99.5	4	4	5	6	9	10
Illinois	37	43	23,147,270	25,109,366	77.2	76.9	23	19	30	36	53	55
Indiana	28	30	11,424,452	11,548,275	98.3	87.4	18	22	20	20	38	42
Iowa	15	13	738,919	732,761	91.9	86.5	15	14	11	13	26	27
Kansas	7	6	1,263,409	1,309,744	100.0	100.0	11	11	3	2	14	13
Kentucky:												
Eastern	22	26	1,203,545	2,443,532	38.5	55.4	19	21	9	6	28	27
Western	28	29	24,334,625	24,923,009	96.7	96.9	10	9	39	44	49	53
Total Kentucky	50	55	25,538,170	27,366,541	90.2	90.8	29	30	48	50	77	80
Maryland	7	11	408,504	381,735	54.4	51.8	1	1	3	4	4	5
Missouri	12	11	3,188,185	3,522,056	99.0	99.5	12	9	5	4	17	13
Montana:												
Bituminous	1	2	1,365	2,144	100.0	100.0	---	---	1	3	1	3
Lignite	---	---	---	---	---	---	---	---	---	---	---	---
Total Montana	1	2	1,365	2,144	.5	.7	---	---	1	3	1	3
New Mexico	3	3	2,551,172	2,777,593	100.0	100.0	2	3	1	1	3	4
North Dakota (lignite)	4	2	908,801	1,075,376	34.5	39.4	1	1	4	3	5	4
Ohio	121	129	19,453,741	21,527,373	78.4	81.7	63	60	106	108	169	168
Oklahoma	12	7	943,804	846,350	92.8	87.8	6	6	5	5	11	11
Pennsylvania	208	234	14,939,628	15,070,880	63.6	63.4	102	101	146	139	248	240
Tennessee	18	23	964,198	1,177,471	46.5	57.0	16	17	8	11	24	28
Virginia	12	14	1,543,688	1,948,871	63.0	63.3	10	10	8	10	18	20
West Virginia	93	97	5,462,818	7,419,705	69.4	70.9	64	58	59	77	123	135
Wyoming	7	6	2,759,341	1,803,221	92.7	57.5	4	3	9	6	13	9
Total	677	734	119,312,811	129,504,535	78.6	78.4	395	381	504	537	899	918

Table 33.—Method of haulage from bituminous coal and lignite strip mines to tipple or ramp, in the United States [1]

Year	Strip mines reporting method of haulage							Strip mines not reporting method of haulage—production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Strip mines using rail, rail and truck, truck and tram—production (net tons)	Strip production			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)		Total (net tons)	Percentage of total		
1948	97,450,399	7,214	9.4	3.7	6,327,989	103,778,388	74.4	35,727,532	139,505,920
1949	73,229,556	6,694	10.1	3.7	5,365,432	78,594,988	74.1	27,450,311	106,045,299
1950	88,666,733	6,564	10.3	3.8	4,364,333	93,031,066	75.3	30,435,498	123,466,564
1951	87,427,029	6,173	10.6	4.0	2,424,994	89,852,023	76.4	27,765,653	117,617,676
1952	88,589,637	5,799	11.3	4.0	2,296,744	90,886,381	83.5	18,023,375	108,909,756
1953	84,764,694	5,287	12.2	4.0	2,104,609	86,869,303	82.4	18,579,266	105,448,569
1954	73,794,489	4,250	13.2	3.9	1,203,753	74,998,242	76.4	23,136,008	98,134,250
1955	94,150,171	4,798	13.3	3.9	2,290,600	96,440,771	83.9	18,651,998	115,092,769
1956	103,127,374	5,432	13.3	4.4	1,056,627	104,184,001	82.0	22,871,381	127,055,382
1957	104,796,728	5,532	14.0	4.3	164,311	104,961,039	84.6	19,147,499	124,108,538
1958	99,223,676	5,151	14.5	4.4	19,241	99,242,917	85.4	16,998,870	116,241,787
1959	102,706,819	4,959	15.3	4.6	------	102,706,819	84.9	18,246,515	120,953,334
1960	104,099,974	4,855	15.5	4.8	------	104,099,974	84.9	18,529,690	122,629,664
1961	101,951,989	4,407	16.5	4.4	------	101,951,989	83.6	20,027,095	121,979,084
1962	109,846,339	4,309	17.7	4.9	------	109,846,339	84.3	20,453,885	130,300,224
1963	119,681,295	4,314	18.5	4.7	------	119,681,295	83.0	24,459,382	144,140,677
1964	132,209,971	4,462	19.5	4.7	------	132,209,971	87.1	19,649,008	151,858,979
1965	138,578,930	4,197	21.3	4.9	------	138,578,930	83.9	26,661,839	165,240,769

[1] Excludes lignite in 1948 and 1949.

Table 34.—Method of haulage from bituminous coal and lignite strip mines to tipple or ramp, in the United States, 1965, by States

State	Strip mines reporting method of haulage					Strip mines not reporting method of haulage—production (net tons)	Total strip production (net tons)
	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)	Production: Net tons	Production: Percentage of total production		
Alabama	101	20.7	5.1	3,035,188	63.1	1,773,656	4,808,844
Alaska	12	36.3	5.6	573,865	64.2	319,317	893,182
Arkansas	12	10.4	1.1	151,593	100.0	------	151,593
Colorado	26	29.3	2.5	1,270,129	100.0	------	1,270,129
Illinois	353	42.8	3.6	32,192,127	98.5	477,456	32,669,583
Indiana	145	38.7	3.0	12,666,920	95.9	543,182	13,210,102
Iowa	42	10.5	3.9	800,099	94.5	46,659	846,758
Kansas	30	35.3	2.7	1,309,744	100.0	------	1,309,744
Kentucky	296	29.9	4.6	22,172,479	73.6	7,970,120	30,142,599
Maryland	38	18.1	4.1	501,121	68.0	235,720	736,841
Missouri	53	36.3	3.7	3,510,593	99.2	27,449	3,538,042
Montana:							
Bituminous	2	7.5	.6	2,144	100.0	------	2,144
Lignite	4	20.0	1.5	298,315	100.0	------	298,315
Total Montana	6	15.8	1.5	300,459	100.0	------	300,459
New Mexico	15	43.2	3.9	2,777,593	100.0	------	2,777,593
North Dakota (lignite)	87	21.3	2.9	2,668,866	97.7	61,728	2,730,594
Ohio	736	20.0	6.1	21,965,560	83.3	4,399,269	26,364,829
Oklahoma	46	19.9	12.2	961,350	99.7	2,711	964,061
Pennsylvania	1,449	14.7	6.6	18,466,570	77.7	5,300,868	23,767,438
South Dakota (lignite)	4	6.0	1.0	10,000	100.0	------	10,000
Tennessee	85	14.8	12.1	703,875	34.1	1,362,902	2,066,777
Virginia	102	16.4	3.8	1,997,815	64.8	1,082,927	3,080,742
Washington	1	10.0	1.0	2,658	100.0	------	2,658
West Virginia	527	16.8	6.2	7,404,371	70.8	3,057,875	10,462,246
Wyoming	31	26.8	7.5	3,135,955	100.0	------	3,135,955
Total	4,197	21.3	4.9	138,578,930	83.9	26,661,839	165,240,769

coal. The size most commonly reported as thermally dried in 1965 was 0.25 by 0-inch coal.

Twenty percent of the bituminous coal mechanically cleaned in 1965 was thermally dried.

Bituminous coal and lignite thermally dried amounted to 65 million tons, or 13 percent of the total production in the United States.

PRODUCTION BY STATES AND COUNTIES

Detailed production and employment statistics are shown in table 54 for each coal-producing county in the United States from which three or more operators submitted reports. Statistics on counties with less than three reporting producers have been combined with data for "Other counties" to avoid disclosing individual figures, except when the Bureau has been granted permission to publish statistics separately. Production of mines on the border between two States has been credited to the State in which the coal was mined rather than to the State where the tipple was. If the coal was mined in both States, the tonnage was apportioned accordingly.

Bituminous coal and lignite were mined in 24 States and 297 counties. As soft coal is the source of a large part of the economic activity in many counties, the key items pertaining to the industry are published by counties, and are useful in analyzing potential markets. These key items are method of shipping the coal, value, number of men working daily, days worked, and tons per man per day.

The most striking fact illustrated by the following table is the wide variation among several counties in the same State, not only in production but also in average value and average tons per man per day. The differences in average value are due to quality of coal, method of mining, method of transportation, or market conditions. The differences in output per man per day are caused mostly by physical conditions, mining methods, and extent of mechanization.

Table 35.—Stripping operations in the bituminous coal and lignite fields of the United States, 1965, by States and counties

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama:						
Bibb	7	168,090	25	267	6,566	25.60
Blount	2	44,301	30	100	2,953	15.00
Etowah	1	134,227	26	310	8,185	16.40
Jackson	1	258,952	32	308	9,798	26.43
Jefferson	14	777,800	137	229	31,338	24.82
Marion	2	157,336	23	243	5,595	28.12
St. Clair	1	35,000	9	140	1,270	27.55
Tuscaloosa	9	1,182,817	147	295	43,279	27.33
Walker	19	1,896,594	266	203	53,988	35.13
Winston	2	153,727	43	239	10,214	15.05
Total Alabama	58	4,808,844	738	235	173,186	27.77
Alaska	4	893,182	217	251	54,462	16.40
Arkansas:						
Franklin	1	87,492	20	172	3,427	25.53
Johnson	W	W	W	W	W	W
Sebastian	W	W	W	W	W	W
Other counties	3	64,101	33	130	4,299	14.91
Total Arkansas	4	151,593	53	146	7,726	19.62
Colorado:						
Fremont	W	W	W	W	W	W
Montrose	W	W	W	W	W	W
Routt	3	1,169,559	92	250	23,036	50.77
Other counties	4	100,570	23	163	3,738	26.90
Total Colorado	7	1,270,129	115	233	26,774	47.44
Illinois:						
Adams	1	26,520	16	161	2,577	10.29
Fulton	7	7,282,709	745	294	219,095	33.24
Gallatin	1	50,243	9	73	670	75.00
Greene	1	5,550	2	288	577	9.62
Grundy	W	W	W	W	W	W
Jackson	W	W	W	W	W	W
Johnson	W	W	W	W	W	W
Knox	W	W	W	W	W	W
Peroria	3	1,286,725	133	297	39,494	32.58
Perry	3	6,503,838	394	309	121,635	53.47
Randolph	W	W	W	W	W	W
St. Clair	W	W	W	W	W	W
Saline	9	2,783,528	514	230	118,297	23.53
Schuyler	W	W	W	W	W	W
Stark	W	W	W	W	W	W
Vermilion	W	W	W	W	W	W
Will	W	W	W	W	W	W
Williamson	8	2,417,637	276	288	79,345	30.47
Other counties	16	12,312,833	1,035	279	288,463	42.68
Total Illinois	49	32,669,583	3,124	279	870,153	37.54
Indiana:						
Clay	6	835,429	146	247	36,181	23.09
Daviess	1	27,088	12	214	2,570	10.54
Fountain	W	W	W	W	W	W
Gibson	W	W	W	W	W	W
Greene	6	1,172,000	190	190	36,017	32.54
Owen	W	W	W	W	W	W
Parke	1	7,032	12	229	2,747	2.56
Perry	W	W	W	W	W	W
Pike	4	1,737,169	192	263	50,397	34.47
Spencer	4	58,956	22	188	4,083	14.44
Sullivan	4	2,155,226	250	276	69,078	31.20
Vigo	W	W	W	W	W	W
Warrick	10	6,265,529	470	240	112,852	55.52
Other counties	5	951,673	139	239	33,158	28.70
Total Indiana	41	13,210,102	1,433	242	347,083	38.06

See footnotes at end of table.

Table 35.—Stripping operations in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Iowa:						
Appanoose	1	1,508	4	18	73	20.80
Keokuk	2	6,707	9	75	671	10.00
Mahaska	6	364,988	59	278	16,301	22.39
Marion	7	436,076	55	277	15,189	28.71
Van Buren	1	15,240	4	144	576	26.45
Wapello	2	22,239	10	176	1,798	12.37
Total Iowa	19	846,758	141	245	34,608	24.47
Kansas:						
Bourbon	1	9,608	3	104	312	30.79
Cherokee	W	W	W	W	W	W
Crawford	W	W	W	W	W	W
Other counties	5	1,300,136	227	269	61,068	21.29
Total Kansas	6	1,309,744	230	267	61,380	21.34
Kentucky, Eastern:						
Bell	17	1,275,943	164	240	39,357	32.42
Boyd	2	30,736	13	291	3,785	8.12
Brethitt	2	337,740	113	200	22,516	15.00
Clay	2	36,411	31	64	1,984	18.35
Floyd	W	W	W	W	W	W
Harlan	11	399,556	79	160	12,608	31.69
Johnson	1	1,500	6	25	150	10.00
Knott	4	383,896	154	100	15,356	25.00
Knox	2	12,000	16	50	800	15.00
Laurel	2	88,356	21	205	4,302	20.54
Leslie	W	W	W	W	W	W
Letcher	W	W	W	W	W	W
Martin	1	6,500	9	50	433	15.00
Morgan	3	56,199	14	200	2,859	19.66
Perry	5	676,241	139	166	23,111	29.26
Pike	5	268,508	36	217	7,900	33.99
Pulaski	1	75,950	6	269	1,587	47.85
Wayne	1	20,000	18	75	1,333	15.00
Whitley	9	75,496	50	90	4,532	16.66
Other counties	5	664,498	297	76	22,503	29.53
Total Eastern Kentucky	73	4,409,530	1,166	142	165,116	26.71
Kentucky, Western:						
Butler	2	78,000	22	140	3,088	25.26
Christian	1	9,465	6	100	631	15.00
Daviess	2	1,036,634	83	316	26,237	39.51
Hancock	1	4,000	8	50	400	10.00
Hopkins	17	3,808,438	444	191	84,726	44.95
Muhlenberg	11	16,089,935	862	312	268,838	59.85
Ohio	6	4,274,284	279	282	78,730	54.29
Union	1	427,760	32	225	7,216	59.28
Webster	2	4,553	4	78	310	14.68
Total Western Kentucky	43	25,733,069	1,740	270	470,176	54.73
Total Kentucky	116	30,142,599	2,906	219	635,292	47.45
Maryland:						
Allegany	18	191,963	47	205	9,550	20.10
Garrett	17	544,878	66	268	17,725	30.74
Total Maryland	35	736,841	113	241	27,275	27.02
Missouri:						
Boone	W	W	W	W	W	W
Calloway	1	25,821	9	332	2,989	8.64
Clark	W	W	W	W	W	W
Dade	1	11,660	6	285	1,720	6.78
Henry	W	W	W	W	W	W
Macon	W	W	W	W	W	W
Putnam	W	W	W	W	W	W

See footnotes at end of table.

Table 35.—Stripping operations in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Missouri cont.:						
St. Clair	1	1,628	3	66	198	8.22
Vernon	2	61,198	27	150	4,080	15.00
Other counties	8	3,437,735	305	294	89,613	38.36
Total Missouri	13	3,538,042	350	282	98,600	35.88
Montana (bituminous):						
Big Horn	(1)	(1)	(1)	(1)	(1)	(1)
Rosebud	(1)	(1)	(1)	(1)	(1)	(1)
Total Montana (bituminous)	(1)	(1)	(1)	(1)	(1)	(1)
Montana (lignite): Richland	(1)	(1)	(1)	(1)	(1)	(1)
Total Montana	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico:						
McKinley	(1)	(1)	(1)	(1)	(1)	(1)
San Juan	(1)	(1)	(1)	(1)	(1)	(1)
Total New Mexico	[1] 6	[1] 3,078,052	[1] 148	[1] 262	[1] 38,807	[1] 79.32
North Dakota (lignite):						
Adams	1	17,388	3	232	584	29.77
Bowman	W	W	W	W	W	W
Burke	W	W	W	W	W	W
Burleigh	1	7,327	3	190	570	12.85
Dunn	1	1,058	2	20	29	36.00
Grant	3	19,515	6	180	1,002	19.48
Hettinger	1	2,500	1	120	120	20.83
McLean	2	46,038	6	299	1,842	25.00
Mercer	W	W	W	W	W	W
Morton	3	19,029	13	101	1,290	14.75
Oliver	1	3,323	1	140	140	23.73
Stark	W	W	W	W	W	W
Ward	W	W	W	W	W	W
Williams	1	3,871	3	75	258	15.00
Other counties	14	2,610,545	267	201	53,653	48.66
Total North Dakota	28	2,730,594	305	195	59,488	45.90
Ohio:						
Athens	3	30,757	15	147	2,140	14.37
Belmont	21	3,047,813	462	252	116,329	26.20
Carroll	7	265,014	50	284	14,217	18.64
Columbiana	38	1,262,852	273	275	75,170	16.80
Coshocton	11	2,125,410	196	278	54,400	39.07
Gallia	W	W	W	W	W	W
Guernsey	6	359,416	84	195	16,393	22.06
Harrison	13	4,144,686	310	267	82,811	50.05
Hocking	6	93,401	29	194	5,647	16.54
Holmes	1	186,501	26	310	8,158	22.86
Jackson	12	562,142	84	272	22,750	24.71
Jefferson	34	3,913,964	475	253	120,060	32.60
Lawrence	W	W	W	W	W	W
Mahoning	16	685,695	128	289	36,945	18.56
Meigs	5	130,387	96	89	8,500	15.34
Morgan	3	1,799,291	214	254	54,261	33.16
Muskingum	7	64,040	44	84	3,697	17.32
Noble	9	2,722,090	236	243	57,368	47.45
Perry	W	W	W	W	W	W
Portage	1	6,472	26	50	1,289	5.02
Stark	14	429,679	84	221	18,585	23.12
Tuscarawas	29	2,198,422	401	285	114,263	19.24
Vinton	5	123,180	37	284	10,457	11.78
Washington	W	W	W	W	W	W
Wayne	3	45,251	10	272	2,659	17.02
Other counties	20	2,168,366	304	239	72,677	29.84
Total Ohio	264	26,364,829	3,584	251	898,776	29.33

See footnotes at end of table.

Table 35.—Stripping operations in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Oklahoma:						
Craig	6	285,462	71	245	17,385	16.42
Haskill	W	W	W	W	W	W
Muskogee	1	1,000	15	35	529	1.89
Okmulgee	1	1,711	2	57	114	15.00
Rogers	W	W	W	W	W	W
Other counties	3	675,888	135	208	28,042	24.10
Total Oklahoma	11	964,061	223	207	46,070	20.93
Pennsylvania:						
Allegheny	19	998,357	139	239	33,279	30.00
Armstrong	39	1,384,536	244	173	42,263	32.76
Beaver	14	300,685	85	233	19,913	15.10
Bedford	W	W	W	W	W	W
Bradford	W	W	W	W	W	W
Butler	45	1,603,610	309	245	75,821	21.15
Cambria	20	983,054	203	222	45,136	21.78
Cameron	W	W	W	W	W	W
Centre	13	524,753	244	297	72,580	7.23
Clarion	70	3,117,964	523	253	132,398	23.55
Clearfield	83	5,800,301	1,314	257	337,619	17.18
Clinton	8	553,016	73	292	21,410	25.83
Elk	8	331,533	28	260	7,156	18.38
Fayette	24	436,129	87	223	19,427	22.45
Greene	7	83,721	29	130	3,807	21.99
Huntingdon	2	54,554	13	235	3,058	17.84
Indiana	30	746,379	229	191	43,750	17.06
Jefferson	36	1,012,347	217	225	48,811	20.74
Lawrence	21	884,170	154	271	41,628	21.24
Lycoming	W	W	W	W	W	W
McKean	2	15,982	54	91	4,873	3.28
Mercer	10	553,424	133	285	38,010	14.56
Somerset	64	2,391,948	423	216	91,400	26.17
Tioga	W	W	W	W	W	W
Venango	12	389,728	79	274	21,628	18.02
Washington	16	662,669	171	223	38,172	17.36
Westmoreland	28	262,649	94	158	14,831	17.71
Other counties	10	675,929	122	250	30,541	22.13
Total Pennsylvania	581	23,767,438	4,967	239	1,187,511	20.01
South Dakota (lignite):						
Dewey	1	10,000	4	125	500	20.00
Tennessee:						
Anderson	8	491,679	56	219	12,344	39.83
Campbell	9	627,384	143	185	26,438	23.73
Claiborne	2	119,554	21	234	4,890	24.45
Grundy	3	202,923	43	260	11,174	18.16
Hamilton	W	W	W	W	W	W
Marion	W	W	W	W	W	W
Morgan	7	206,503	48	194	9,298	22.21
Scott	4	52,000	25	50	1,225	42.44
Sequatchie	W	W	W	W	W	W
Van Buren	5	242,959	43	206	8,893	27.32
Other counties	3	123,775	60	104	6,215	19.31
Total Tennessee	41	2,066,777	439	183	80,477	25.68
Virginia:						
Buchanan	14	440,721	66	245	16,055	27.45
Dickenson	13	636,595	47	234	11,004	57.85
Lee	W	W	W	W	W	W
Russell	1	1,992	3	50	133	15.00
Tazewell	W	W	W	W	W	W
Wise	23	1,907,568	227	241	54,642	34.91
Other counties	5	93,866	26	176	4,583	24.48
Total Virginia	56	3,080,742	369	234	86,417	35.65
Washington: Lewis	1	2,658	2	89	178	14.93
West Virginia:						
Barbour	15	1,440,239	181	213	38,509	37.40
Boone	7	1,018,817	128	257	32,939	30.93
Brooke	7	382,585	77	241	18,581	20.59

See footnotes at end of table.

Table 35.—Stripping operations in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
West Virginia cont.:						
Fayette	11	468,560	121	163	19,671	23.82
Grant	W	W	W	W	W	W
Greenbrier	2	9,767	8	100	750	13.02
Hancock	1	3,658	5	50	244	15.00
Harrison	24	1,320,055	240	199	47,690	27.68
Kanawha	7	154,600	60	82	4,928	31.37
Lewis	6	331,792	240	91	21,843	15.19
Lincoln	3	17,890	12	100	1,193	15.00
Logan	W	W	W	W	W	W
Marion	W	W	W	W	W	W
Mason	W	W	W	W	W	W
McDowell	5	580,767	69	253	17,409	33.36
Mercer	W	W	W	W	W	W
Mineral	W	W	W	W	W	W
Mingo	1	4,371	4	30	109	40.00
Monongalia	11	181,386	37	204	7,593	23.89
Nicholas	W	W	W	W	W	W
Preston	28	1,302,927	205	264	54,176	24.05
Raleigh	12	565,256	147	133	19,607	28.83
Randolph	5	124,600	27	176	4,805	25.93
Taylor	7	179,267	44	151	6,627	27.05
Tucker	6	394,530	49	181	8,820	44.73
Upshur	5	161,146	40	124	4,939	32.63
Webster	W	W	W	W	W	W
Wyoming	8	517,161	71	219	15,540	33.28
Other counties	20	1,302,872	265	180	47,674	27.33
Total West Virginia	191	10,462,246	2,030	184	373,647	28.00
Wyoming:						
Campbell	1	490,527	32	261	8,327	58.91
Carbon	W	W	W	W	W	W
Converse	W	W	W	W	W	W
Lincoln	W	W	W	W	W	W
Sheridan	2	349,338	38	250	9,514	36.72
Other counties	6	2,296,090	168	244	40,997	56.01
Total Wyoming	9	3,135,955	238	247	58,838	53.30
Total United States	1,541	165,240,769	21,729	238	5,167,248	31.98

W Withheld to avoid disclosing individual company data; included with "other counties."
[1] To avoid disclosing individual operations Montana and New Mexico are combined.

TRANSPORTATION

Transportation of coal and of coal energy have undergone significant changes within the past few years, due principally to the advent of "unit trains" and advances in the development of extra-high-voltage (EHV) transmission of coal-generated power from utilities plants at or near the mines. Unit trains are complete trains of assigned cars and locomotives operating on regularly scheduled cycles between specified origins and destinations. They carry up to 10,000 tons or more, and have been effective in reducing the average cost of rail transportation of coal. This is very important because of the relatively high proportion of transportation cost in delivered coal prices, and therefore of importance in coal's competition with other energy sources.

Other changes in coal transportation are a decline in shipments by rail and increases in shipments by water and truck. For short distances, shipments by water or truck usually are at lower rates than by rail.

CONSUMPTION

The statistics on consumption of bituminous coal and lignite, by major consumer classes, are based upon complete coverage of all consumers in each class except "Other manufacturing and mining industries" and "Retail deliveries to other consumers." The figures for both categories are based upon a monthly sample approxi-

Table 36.—Auger mines in the bituminous coal and lignite fields of the United States, 1965, by States and counties

State and county	Number of auger mines	Equipment in use (number of units) Augers	Power shovels	Power drills	Bull-dozers	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama:										
Blount	1	1	---	---	---	7,487	7	50	374	20.00
Walker	4	5	---	---	2	92,634	27	196	5,225	17.73
Total Alabama	5	6	---	---	2	100,121	34	165	5,599	17.88
Kentucky, Eastern:										
Bell	8	9	---	---	---	306,573	34	121	4,088	75.00
Breathitt	1	1	---	---	---	20,000	5	150	800	25.00
Clay	1	1	---	---	---	64,761	21	50	1,035	62.55
Floyd	W	W	W	W	W	W	W	W	W	W
Harlan	15	15	---	4	14	410,913	49	154	7,526	54.60
Knott	4	4	---	---	2	347,469	84	200	16,867	20.60
Leslie	W	W	W	W	W	W	W	W	W	W
Letcher	17	18	---	1	5	760,353	67	180	12,067	63.01
Martin	2	2	---	---	---	34,000	23	75	1,700	20.00
Perry	17	17	1	2	18	894,994	95	194	18,404	48.63
Pike	40	39	1	1	12	1,738,437	242	149	36,120	48.13
Pulaski	1	1	---	---	---	40,000	7	200	1,333	30.00
Other counties	8	8	---	---	2	260,500	64	93	5,925	43.97
Total Eastern Kentucky	114	115	2	8	53	4,878,000	691	153	105,865	46.08
Kentucky, Western:										
Christian	1	1	1	---	2	9,465	9	50	473	20.00
Hopkins	1	1	---	---	---	27,950	5	150	755	37.00
Ohio	1	1	---	---	2	19,463	4	81	324	60.07
Total Western Kentucky	3	3	1	---	4	56,878	18	86	1,552	36.65
Total Kentucky	117	118	3	8	57	4,934,878	709	152	107,417	45.94
Maryland:										
Allegany	1	1	---	---	---	2,000	2	50	100	20.00
Garrett	1	1	---	---	---	35,791	18	100	1,790	20.00
Total Maryland	2	2	---	---	---	37,791	20	95	1,890	20.00
Ohio:										
Belmont	12	10	1	1	8	312,803	39	98	3,842	81.42
Columbiana	8	9	1	---	7	140,812	28	142	3,980	35.38
Coshocton	1	1	---	---	3	96,273	11	240	2,520	38.20
Gallia	3	3	---	---	3	112,142	12	131	1,629	68.83
Guernsey	1	1	---	---	---	3,970	58	91	5,293	75.00
Harrison	3	3	---	---	2	49,696	11	61	697	71.28

See footnotes at end of table.

Table 36.—Auger mines in the bituminous coal and lignite fields of the United States, 1965, by States and counties—Continued

State and county	Number of auger mines	Equipment in use (number of units)				Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
		Augers	Power shovels	Power drills	Bull-dozers					
Ohio, cont.:										
Hocking	W	W	W	W	W	W	W	W	W	W
Jefferson	10	8	---	1	3	202,502	21	120	2,470	81.98
Mahoning	W	W	W	W	W	W	W	W	W	W
Meigs	3	2	---	---	2	104,283	17	125	2,149	48.53
Noble	4	4	---	---	4	262,693	15	230	3,490	75.27
Perry	W	W	W	W	W	W	W	W	W	W
Stark	1	1	---	---	1	5,566	2	75	157	35.40
Tuscarawas	10	7	---	---	5	164,704	15	150	2,316	71.11
Washington	1	1	---	---	2	13,611	8	40	311	43.75
Other counties	3	3	1	---	4	288,256	33	142	4,673	61.69
Total Ohio	60	53	3	2	44	1,757,311	270	124	33,527	52.41
Oklahoma: Haskell	1	1	---	---	---	1,119	3	13	38	29.44
Pennsylvania:										
Allegheny	W	W	W	W	W	W	W	W	W	W
Armstrong	11	12	---	1	6	83,495	17	104	1,747	47.79
Beaver	W	W	W	W	W	W	W	W	W	W
Butler	12	16	2	---	7	177,269	35	120	4,259	41.62
Cambria	W	W	W	W	W	W	W	W	W	W
Centre	2	3	---	---	---	47,469	164	24	3,946	12.03
Clarion	4	4	---	1	3	68,656	9	134	1,249	54.95
Clearfield	9	10	1	5	3	143,772	31	225	6,905	20.82
Elk	4	4	1	---	3	45,976	12	175	2,024	22.71
Fayette	W	W	W	W	W	W	W	W	W	W
Huntingdon	1	1	---	---	---	3,300	6	30	165	20.00
Indiana	4	4	---	---	3	45,115	10	121	1,249	36.12
Jefferson	5	6	1	---	4	48,734	15	127	1,960	24.86
Lawrence	W	W	W	W	W	W	W	W	W	W
Venango	W	W	W	W	W	W	W	W	W	W
Washington	W	W	W	W	W	W	W	W	W	W
Westmoreland	1	1	---	---	---	6,200	10	30	310	20.00
Other counties	12	14	4	3	9	196,125	59	58	3,438	57.05
Total Pennsylvania	65	75	9	10	38	866,111	368	74	27,252	31.78
Tennessee:										
Anderson	2	3	---	---	3	64,768	19	100	1,851	35.00
Campbell	3	3	---	---	2	75,000	20	150	3,000	25.00
Claiborne	2	2	1	---	1	19,432	7	159	1,094	17.77
Scott	2	2	---	---	---	58,062	6	250	1,452	40.00
Total Tennessee	9	10	1	---	6	217,262	52	142	7,397	29.37

See footnote at end of table.

Virginia:										
Buchanan	31	31	---	4	29	795,347	81	184	14,905	53.36
Dickerson	10	10	---	1	11	217,598	54	100	5,440	40.00
Lee	W	W	W	W	W	W	W	W	W	W
Tazewell	W	W	W	W	W	W	W	W	W	W
Wise	17	18	---	4	14	433,072	32	219	6,978	62.06
Other counties	4	4	---	---	4	160,967	28	149	4,171	38.59
Total Virginia	62	63	---	9	58	1,606,984	195	162	31,494	51.03
West Virginia:										
Barbour	W	W	W	W	W	W	W	W	W	W
Boone	8	11	2	---	11	1,305,155	95	223	21,232	61.47
Brooke	W	W	W	W	W	W	W	W	W	W
Clay	W	W	W	W	W	W	W	W	W	W
Fayette	5	6	1	---	6	364,738	33	177	5,876	62.07
Grant	W	W	W	W	W	W	W	W	W	W
Harrison	9	8	1	---	8	148,867	33	50	1,654	90.00
Kanawha	12	13	3	---	12	944,405	156	166	25,867	36.51
Logan	7	6	1	2	9	628,174	58	140	8,141	77.16
Mason	W	W	W	W	W	W	W	W	W	W
McDowell	9	10	1	---	4	200,304	32	188	5,944	33.70
Mercer	4	4	---	---	2	35,504	17	133	2,241	15.84
Mingo	5	7	---	---	8	257,735	40	169	6,827	37.75
Monongalia	1	1	---	---	---	8,911	3	60	180	49.51
Nicholas	W	W	W	W	W	W	W	W	W	W
Preston	W	W	W	W	W	W	W	W	W	W
Raleigh	11	11	4	3	15	408,346	59	147	8,707	46.90
Webster	1	1	---	---	1	12,316	41	20	821	15.00
Wyoming	W	W	W	W	W	W	W	W	W	W
Other counties	14	14	1	---	6	350,226	50	146	7,301	47.97
Total West Virginia	86	92	14	5	82	4,664,681	617	154	94,791	49.21
Total United States	407	420	30	34	287	14,186,258	2,268	136	309,405	45.85

W Withheld to avoid disclosing individual company data; included with "Other counties."

Table 37.—Growth of mechanical loading at underground bituminous coal and lignite mines in the United States

Year	Underground production (thousand net tons)							Percentage of underground production		Number of mechanical loading units				
	Mechanically loaded													
	Conventional mining													
	Mobile loading machines	Duck-bills and scrapers [1]	Hand-loaded conveyors and pit-car loaders [1]	Continuous mining	Total	Hand-loaded into mine cars	Total	Mechanically loaded	Hand-loaded into mine cars	Mobile loading machines used in conventional mining	Duck-bills and scrapers [1]	Hand-loaded conveyors and pit-car loaders [1]	Continuous mining machines	Mobile loading machines used in conjunction with continuous mining
1923	NA	NA	NA	---	[2] 1,880	550,745	552,625	0.3	99.7	NA	NA	NA	---	---
1924	NA	NA	NA	---	[2] 3,496	466,584	470,080	.7	99.3	NA	NA	NA	---	---
1925	NA	NA	NA	---	[2] 6,243	496,939	503,182	1.2	98.8	NA	NA	NA	---	---
1926	7,786	2,236	523	---	[2] 10,545	545,899	556,444	1.9	98.1	295	160	NA	---	---
1927	NA	NA	NA	---	16,500	482,885	499,385	3.3	96.7	NA	NA	NA	---	---
1928	11,811	2,748	7,000	---	21,559	459,397	480,956	4.5	95.5	397	212	1,040	---	---
1929	16,432	2,859	18,571	---	37,862	476,859	514,721	7.4	92.6	488	225	2,521	---	---
1930	20,073	3,265	23,644	---	46,982	400,702	447,684	10.5	89.5	545	290	2,876	---	---
1931	19,407	3,282	24,873	---	47,562	315,595	363,157	13.1	86.9	583	311	3,428	---	---
1932	14,825	2,762	18,230	---	35,817	254,252	290,069	12.3	87.7	548	287	3,112	---	---
1933	17,865	2,647	17,309	---	37,821	277,539	315,360	12.0	88.0	523	225	2,978	---	---
1934	20,750	3,086	17,597	---	41,433	297,145	338,578	12.2	87.8	534	276	2,862	---	---
1935	24,675	3,713	18,789	---	47,177	301,549	348,726	13.5	86.5	657	257	2,768	---	---
1936	40,970	4,513	21,494	---	66,977	343,985	410,962	16.3	83.7	980	340	2,787	---	---
1937	NA	NA	NA	---	83,500	330,280	413,780	20.2	79.8	NA	NA	NA	---	---
1938	57,824	5,279	21,990	---	85,093	233,045	318,138	26.7	73.3	1,405	463	2,918	---	---
1939	76,442	7,766	26,504	---	110,712	246,421	357,133	31.0	69.0	1,573	690	2,707	---	---
1940	100,962	11,617	35,291	---	147,870	269,734	417,604	35.4	64.6	1,720	772	2,960	---	---
1941	126,478	16,208	43,981	---	186,667	272,411	459,078	40.7	59.3	1,985	897	3,414	---	---
1942	160,301	22,088	50,514	---	232,903	282,587	515,490	45.2	54.8	2,301	1,155	3,522	---	---
1943	179,008	24,266	46,531	---	249,805	260,687	510,492	48.9	51.1	2,525	1,309	3,512	---	---
1944	202,875	24,505	46,809	---	274,189	244,489	518,678	52.9	47.1	2,737	1,418	3,477	---	---
1945	198,668	22,758	41,086	---	262,512	205,118	467,630	56.1	43.9	2,950	1,470	3,527	---	---
1946	186,975	20,595	37,771	---	245,341	175,617	420,958	58.3	41.7	3,200	1,596	3,563	---	---
1947	229,836	22,775	45,546	---	298,157	193,072	491,229	60.7	39.3	3,569	1,598	4,050	---	---
1948	232,217	20,377	42,762	450	295,806	164,206	460,012	64.3	35.7	[3] 3,965	1,688	4,162	15	NA
1949	174,639	14,333	30,804	2,600	222,376	109,447	331,823	67.0	33.0	[3] 4,155	1,529	4,329	50	NA
1950	218,126	14,303	35,446	4,850	272,725	120,119	392,844	69.4	30.6	[3] 4,228	1,368	4,446	90	NA
1951	246,397	14,010	37,583	6,061	304,051	111,791	415,842	73.1	26.9	[3] 4,302	1,264	3,904	108	NA
1952	218,982	10,667	31,130	8,215	268,994	87,431	356,425	75.5	24.5	[3] 4,083	1,068	3,569	152	NA
1953	232,585	8,770	25,144	11,830	278,329	71,222	349,551	79.6	20.4	[3] 3,985	878	2,994	219	NA
1954	206,546	5,083	15,005	16,336	242,970	46,142	289,112	84.0	16.0	[4] 4,224	681	2,162	325	90

1955	243,204	4,510	15,497	27,460	290,671	52,794	343,465	84.6	15.4	[4] 3,679	510	1,925	385	140
1956	248,341	3,883	15,271	39,907	307,402	58,372	365,774	84.0	16.0	[4] 3,666	472	1,819	510	188
1957	236,720	2,781	12,453	53,783	305,737	54,912	360,649	84.8	15.2	[4] 3,556	375	1,528	614	199
1958	178,014	1,560	7,626	56,373	243,573	43,311	286,884	84.9	15.1	[4] 3,212	249	1,230	679	222
1959	171,150	1,010	5,779	65,792	243,731	39,703	283,434	86.0	14.0	[4] 2,895	144	1,014	776	226
1960	162,109	1,232	4,517	77,928	245,786	39,102	284,888	86.3	13.7	[4] 2,707	159	931	879	245
1961	145,134	1,032	4,863	84,321	235,350	37,416	272,766	86.3	13.7	[4] 2,348	130	867	927	235
1962	145,962	488	4,296	90,174	240,920	40,346	281,266	85.7	14.3	[4] 2,235	100	825	961	267
1963	150,303	457	4,131	104,350	259,241	43,015	302,256	85.8	14.2	[4] 2,186	81	680	1,030	249
1964	152,409	313	3,702	124,677	281,101	40,707	321,808	87.4	12.6	[4] 2,159	73	585	1,111	237
1965	151,409	273	3,013	141,938	296,633	36,028	332,661	89.2	10.8	[4] 2,102	46	472	1,218	292

NA Not available.
[1] For separate data by type of loading, see Minerals Yearbook 1959, v. 2, p. 86. Canvass of pit-car loaders discontinued in 1951.
[2] Exclusive of tonnage "Handled by conveyors."
[3] Includes mobile loading machines used in conjunction with continuous mining.
[4] Mobile loading machines used in conjunction with continuous mining shown separately in last column of this table.

Table 38.—Bituminous coal and lignite mechanically loaded underground in the United States, by type of loading equipment

Type of loading equipment	1964		1965	
	Net tons	Percentage of tons	Net tons	Percentage of tons
Mobile machines:				
Direct into mine cars	7,093,848	2.5	9,976,410	3.4
Onto conveyors	2,770,863	1.0	3,230,804	1.1
Into shuttle cars	142,544,548	50.7	138,202,034	46.6
Continuous-mining machines:				
Onto conveyors	17,322,123	6.2	17,113,169	5.7
Into shuttle cars	107,354,917	38.2	124,825,233	42.1
Scrapers and conveyors equipped with duckbills or other self-loading heads	312,595	.1	272,585	.1
Hand-loaded conveyors	3,701,612	1.3	3,012,756	1.0
Total mechanically loaded	281,100,506	100.0	296,632,991	100.0

mating 35 percent coverage. A new benchmark representing complete coverage for "Other manufacturing and mining industries" was established for 1954, based upon data from the Census of Manufactures and the Census of Mineral Industries. The new benchmark for "Retail deliveries to other consumers" for 1954 represents the residual tonnage not otherwise accounted for, and includes some coal shipped by truck from mine to final destination.

Data for each month are determined by matching plants reporting for the latest month with identical plants reporting the preceding month, calculating the percentage change from the previous month, and applying this percentage change to the published figure for the previous month. The results have been reasonably reliable over a period of years. A detailed analysis of the establishment of the new benchmarks and the revisions in "Cement mills," "Steel and rolling mills," and "Bunker, foreign, and lake vessels," is given in Bureau of Mines Weekly Coal Report 2113, March 14, 1958. The total of the classes approximates total consumption and is a much more reliable figure than calculated consumption based on production, imports, exports, and changes in stocks, because certain significant items of stocks are not included in yearend stocks. See figure 13.

DISTRIBUTION OF BITUMINOUS COAL AND LIGNITE

Tables 59, 60, and 61 summarize the shipment of bituminous coal and lignite in 1965 from coal-producing districts of origin to geographic divisions and States of destination, by types of consumer use and by methods of transportation. This information shows the participation of the bituminous coal and lignite industry in various energy markets of the Nation, both locally and nationally. It also provides benchmarks for special studies and analyses of the many factors that influence coal production and its utilization in the highly competitive energy market.

The data by consumer use shown in these tables do not necessarily conform to the consumption data shown in table 57 because the latter represent actual consumption at consumers' facilities whereas the distribution data shown here represent shipments from the mines, some of which may be in transit or in consumers' storage.

Total shipments in 1965 increased 5.6 percent over 1964, with every geographic division sharing in the increase. Tonnagewise the greatest gains were in the East North Central, Middle Atlantic, South Atlantic, and Mountain geographic divisions. Shipments to Canada increased nearly 1.5 million tons.

Of the total increase in shipments in 1965 over the 1964 level, amounting to 27 million tons, electric utilities received nearly 20 million tons, coke and gas plants got almost 5 million tons, overseas exports over 1 million tons, and all others about 1 million tons.

Table 62 shows, on a comparative basis, the total tons shipped to all types of consumers during the years 1960–65 and the percentage of total shipments during each year moved to each geographic region and State. From these data one can readily determine the size of the total market, the relative position of regional and State mar-

Table 39.—Comparative changes in underground mechanical loading of bituminous coal and lignite by principal types of loading devices in the United States, by States

State	Loading machines [1] (net tons)		Continuous-mining machines (net tons)		Hand-loaded conveyors (net tons)		Total mechanically loaded (net tons)		Total production at mines using mechanical loading devices (net tons)		Handled by each class (percent)					
											Loading machines [1]		Continuous mining machines		Hand-loaded conveyors	
	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965
Alabama	9,445,506	8,857,719	---	100,000	274,823	218,945	9,720,329	9,176,664	9,729,822	9,176,664	97.2	96.5	---	1.1	2.8	2.4
Arkansas	---	---	---	---	73,884	74,295	73,884	74,295	73,884	74,295	---	---	---	---	100.0	100.0
Colorado	1,341,872	1,396,813	1,822,837	1,892,199	197,892	205,400	3,362,601	3,494,412	3,363,656	3,498,816	39.9	40.0	54.2	54.1	5.9	5.9
Illinois	16,001,259	15,717,831	9,011,966	10,082,740	---	---	25,013,225	25,800,571	25,013,225	25,800,571	64.0	60.9	36.0	39.1	---	---
Indiana	3,205,040	2,341,156	223,268	---	---	---	3,428,308	2,341,156	3,428,308	2,341,156	93.5	100.0	6.5	---	---	---
Iowa	123,359	166,728	---	---	---	---	123,359	166,728	123,359	166,728	100.0	100.0	---	---	---	---
Kentucky	29,139,050	31,711,655	6,245,567	7,104,461	198,042	193,311	35,582,659	39,009,427	35,809,788	39,420,727	81.9	81.3	17.5	18.2	.6	.5
Maryland	70,855	137,684	102,211	140,054	12,270	5,757	185,336	283,495	220,691	283,795	38.2	48.6	55.2	49.4	6.6	2.0
Montana	39,388	53,900	---	---	1,572	1,814	40,960	55,714	41,560	57,914	96.2	96.7	---	---	3.8	3.3
New Mexico	---	---	397,574	421,262	1,472	---	399,046	421,262	399,046	421,262	---	---	99.6	100.0	.4	---
Ohio	5,683,120	5,699,355	4,519,237	5,169,253	59,357	51,666	10,261,714	10,920,274	10,332,730	10,941,203	55.4	52.2	44.0	47.3	.6	.5
Oklahoma	---	---	---	---	6,914	6,657	6,914	6,657	6,914	6,657	---	---	---	---	100.0	100.0
Pennsylvania	10,673,662	9,807,994	38,831,927	43,764,748	846,245	684,546	50,351,834	54,257,288	50,437,033	54,358,763	21.2	18.1	77.1	80.6	1.7	1.3
Tennessee	1,863,974	1,645,802	380,752	552,434	162,747	198,817	2,407,473	2,397,053	2,410,473	2,426,564	77.4	68.7	15.8	23.0	6.8	8.3
Utah	1,967,536	1,680,118	2,751,221	3,302,505	---	6,918	4,718,757	4,989,541	4,719,843	4,989,541	41.7	33.7	58.3	66.2	---	.1
Virginia	12,071,260	10,763,337	3,323,982	5,897,656	117,401	147,104	15,512,643	16,808,097	16,309,413	17,831,267	77.8	64.0	21.4	35.1	.8	.9
Washington	42,125	43,275	---	---	25,933	8,825	68,058	52,100	68,058	52,100	61.9	83.1	---	---	38.1	16.9
West Virginia	60,942,161	61,536,634	57,066,498	63,511,090	1,709,281	1,206,695	119,717,940	126,254,419	120,064,380	126,456,638	50.9	48.7	47.7	50.3	1.4	1.0
Wyoming	111,687	121,832	---	---	13,779	2,006	125,466	123,838	125,497	123,838	89.0	98.4	---	---	11.0	1.6
Total	152,721,854	151,681,833	124,677,040	141,938,402	3,701,612	3,012,756	281,100,506	296,632,991	282,677,680	298,428,499	54.3	51.1	44.4	47.9	1.3	1.0

[1] Includes mobile loading machines, scrapers, and conveyors equipped with duckbills or other self-loading heads.

Table 40.—Number of bituminous coal and lignite underground mines using mechanical loading devices and number of units in use in the United States, by States

State	Number of mines										Number of loading devices							
	Using loading machines only [1]		Using continuous mining machines only		Using hand-loaded conveyors only		Using both continuous and conventional mining machines with mechanical loading		Total		Loading machines: Mobile [2]		Loading machines: Scrapers and duckbills or other self-loading conveyors		Continuous mining machines		Hand-loaded conveyors (number of units)	
	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965
Alabama	16	17	---	---	4	2	1	1	21	20	85	87	4	4	---	1	49	25
Arkansas	---	---	---	---	5	4	---	---	5	4	---	---	---	---	---	---	15	13
Colorado	34	34	8	8	9	13	6	6	57	61	68	73	15	15	26	28	35	35
Illinois	33	27	6	7	---	---	2	3	41	37	104	82	5	2	43	55	---	---
Indiana	16	16	---	---	---	---	2	---	18	16	53	49	---	---	6	---	---	---
Iowa	3	2	---	---	---	---	---	---	3	2	5	5	---	---	---	---	---	---
Kentucky	248	301	16	16	13	11	12	13	289	341	466	519	6	---	64	63	22	32
Maryland	2	4	2	2	3	2	---	---	7	8	4	8	---	---	2	3	6	3
Montana	6	6	---	---	1	1	---	---	7	7	6	5	7	7	---	---	1	2
New Mexico	---	---	1	1	1	---	---	---	2	1	4	4	---	---	4	4	1	---
Ohio	18	18	4	5	7	5	5	2	84	80	69	58	2	2	45	52	14	9
Oklahoma	---	---	---	---	2	2	---	---	2	2	---	---	---	---	---	---	2	2
Pennsylvania	61	52	72	98	75	66	25	25	233	241	270	286	12	4	372	408	169	142
Tennessee	17	19	3	3	20	20	---	2	40	44	84	87	---	---	7	9	30	35
Utah	24	19	4	6	---	---	7	5	35	30	93	76	3	3	42	33	---	3
Virginia	125	152	6	24	4	3	6	7	141	186	197	178	---	---	31	56	9	7
Washington	3	3	---	---	2	1	---	---	5	4	3	3	---	---	---	---	4	3
West Virginia	300	313	97	105	67	58	87	109	551	585	930	924	4	4	469	506	205	160
Wyoming	4	4	---	---	1	1	1	---	6	5	5	5	15	5	---	---	23	1
Total	910	987	219	275	214	189	154	173	1,497	1,624	2,396	2,394	73	46	1,111	1,218	585	472

[1] Includes mobile loading machines, scrapers, and conveyors equipped with duckbills or other self-loading heads.
[2] Includes mobile loading machines used in conjunction with continuous mining.

Table 41.—Production at bituminous coal and lignite underground mines in the United States, by States and methods of loading

State	Hand loaded (net tons)		Mechanically loaded (net tons)		Total underground production (net tons)		Underground output hand loaded (percent)		Underground output mechanically loaded (percent)	
	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965
Alabama	741,623	745,963	9,720,329	9,176,664	10,461,952	9,922,627	7.1	7.5	92.9	92.5
Arkansas	-----	-----	73,884	74,295	73,884	74,295	-----	-----	100.0	100.0
Colorado	46,737	25,917	3,362,601	3,494,412	3,409,338	3,520,329	1.4	.7	98.6	99.3
Georgia	3,900	-----	-----	-----	3,900	-----	100.0	-----	-----	-----
Illinois	21,251	13,054	25,013,225	25,800,571	25,034,476	25,813,625	.1	.1	99.9	99.9
Indiana	24,669	14,151	3,428,308	2,341,156	3,452,977	2,355,307	.7	.6	99.3	99.4
Iowa	46,234	29,756	123,359	166,728	169,593	196,484	27.3	15.1	72.7	84.9
Kentucky	14,200,187	11,678,807	35,582,659	39,009,427	49,782,846	50,688,234	28.5	23.0	71.5	77.0
Maryland	200,189	151,606	185,336	283,495	385,525	435,101	51.9	34.8	48.1	65.2
Missouri	32,687	25,701	-----	-----	32,687	25,701	100.0	100.0	-----	-----
Montana:										
Bituminous	3,581	5,330	40,960	55,714	44,541	61,044	8.0	8.7	92.0	91.3
Lignite	5,859	2,970	-----	-----	5,859	2,970	100.0	100.0	-----	-----
Total Montana	9,440	8,300	40,960	55,714	50,400	64,014	18.7	13.0	81.3	87.0
New Mexico	19,254	13,058	399,046	421,262	418,300	434,320	4.6	3.0	95.4	97.0
North Dakota (lignite)	1,867	1,341	-----	-----	1,867	1,341	100.0	100.0	-----	-----
Ohio	483,148	347,307	10,261,714	10,920,274	10,744,862	11,267,581	4.5	3.1	95.5	96.9
Oklahoma	3,829	2,175	6,914	6,657	10,743	8,832	35.6	24.6	64.4	75.4
Pennsylvania	1,624,316	1,417,612	50,351,834	54,257,288	51,976,150	55,674,900	3.1	2.5	96.9	97.5
Tennessee	1,256,674	1,184,081	2,407,473	2,397,053	3,664,147	3,581,134	34.3	33.1	65.7	66.9
Utah	1,086	2,462	4,718,757	4,989,541	4,719,843	4,992,003	-----	.1	100.0	99.9
Virginia	12,552,159	12,557,092	15,512,643	16,808,097	28,064,802	29,365,189	44.7	42.8	55.3	57.2
Washington	-----	-----	68,058	52,100	68,058	52,100	-----	-----	100.0	100.0
West Virginia	9,438,127	7,809,862	119,717,940	126,254,419	129,156,067	134,064,281	7.3	5.8	92.7	94.2
Wyoming	31	-----	125,466	123,838	125,497	123,838	-----	-----	100.0	100.0
Total	40,707,408	36,028,245	281,100,506	296,632,991	321,807,914	332,661,236	12.6	10.8	87.4	89.2

Table 42.—Growth of mechanical cleaning at bituminous coal and lignite mines in the United States

Year	Total production (thousand tons)	Mechanical cleaning: Number of cleaning plants	Raw coal (thousand tons)	Cleaned coal (thousand tons)	Refuse (thousand tons)	Percentage of refuse to raw coal	Percentage of total production mechanically cleaned
1927	517,763	NA	NA	27,692	NA	NA	5.3
1928	500,745	236	NA	28,783	NA	NA	5.7
1929	534,989	280	40,241	36,799	3,442	8.6	6.9
1930	467,526	297	42,645	38,800	3,845	9.0	8.3
1931	382,089	312	39,529	36,172	3,357	8.5	9.5
1932	309,710	309	32,903	30,279	2,625	8.0	9.8
1933	333,630	290	37,682	34,558	3,124	8.3	10.4
1934	359,368	293	43,556	39,827	3,729	8.6	11.1
1935	372,373	320	49,473	45,361	4,112	8.3	12.2
1936	439,088	342	67,162	61,095	6,067	9.0	13.9
1937	445,531	NA	NA	65,000	NA	NA	14.6
1938	348,545	374	71,207	63,455	7,752	10.9	18.2
1939	394,855	366	88,895	79,429	9,466	10.6	20.1
1940	460,771	387	115,692	102,270	13,422	11.6	22.2
1941	514,149	417	133,379	117,540	15,839	11.9	22.9
1942	582,693	438	162,598	142,187	20,411	12.6	24.4
1943	590,177	432	167,310	145,576	21,734	13.0	24.7
1944	619,576	439	182,071	158,727	23,344	12.8	25.6
1945	577,617	439	172,899	147,886	25,013	14.5	25.6
1946	533,922	445	163,633	138,670	24,963	15.3	26.0
1947	630,624	461	206,620	174,436	32,184	15.6	27.7
1948	599,518	502	215,217	189,880	34,337	16.0	30.2
1949	437,868	571	184,691	153,652	31,039	16.8	35.1
1950	516,311	612	238,391	198,699	39,692	16.7	38.5
1951	533,665	631	289,838	240,010	49,828	17.2	45.0
1952	466,841	625	274,246	227,265	46,981	17.1	48.7
1953	457,290	611	295,654	241,759	53,895	18.2	52.9
1954	391,706	613	287,005	232,764	54,240	18.9	59.4
1955	464,633	575	335,458	272,715	62,743	18.7	58.7
1956	500,874	583	359,378	292,365	67,013	18.6	58.4
1957	492,704	593	376,546	304,027	72,519	19.3	61.7
1958	410,446	573	320,898	259,035	61,863	19.3	63.1
1959	412,028	555	337,138	269,787	67,351	20.0	65.5
1960	415,512	535	337,686	273,169	65,517	19.3	65.7
1961	402,977	503	328,200	264,711	63,489	19.3	65.7
1962	422,149	508	339,408	271,633	67,775	20.0	64.3
1963	458,928	499	362,141	289,462	72,679	20.1	63.1
1964	486,998	495	388,134	310,203	77,931	20.1	63.7
1965	512,088	497	419,046	332,256	86,790	20.7	64.9

NA Not available.

Table 43.—Mechnical cleaning at bituminous coal and lignite mines in the United States, 1965, by States

State	Total production (net tons)	Mechanical cleaning: Number of cleaning plants	Raw coal (net tons)	Cleaned coal (net tons)	Refuse (net tons)	Percentage of refuse to raw coal	Percentage of total production mechanically cleaned
Alabama	14,831,592	26	18,018,121	11,334,517	6,683,604	37.1	76.4
Alaska	893,182	4	690,521	378,419	312,102	45.2	42.4
Arkansas	225,888	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	4,790,458	4	2,126,841	1,705,518	421,323	19.8	35.6
Illinois	58,483,208	49	59,237,595	48,097,668	11,139,927	18.8	82.2
Indiana	15,565,409	15	15,006,211	12,393,644	2,612,567	17.4	79.6
Kansas	1,309,744	3	1,941,872	1,290,089	651,783	33.6	98.5
Kentucky	85,765,711	60	55,435,283	45,048,897	10,386,386	18.7	52.5
Missouri	3,563,743	5	2,660,360	2,003,998	656,362	24.7	56.2
Montana (bituminous)	63,188	(1)	(1)	(1)	(1)	(1)	(1)
New Mexico	3,211,913	1	726,534	421,262	305,272	42.0	13.1
Ohio	39,389,721	22	18,045,135	14,309,157	3,735,978	20.7	36.3
Oklahoma	974,012	(1)	(1)	(1)	(1)	(1)	(1)
Pennsylvania	80,308,449	101	71,122,375	55,700,061	15,422,314	21.7	69.4
Tennessee	5,865,173	[2] 4	[2] 324,712	[2] 287,587	[2] 37,125	11.4	[2] 4.0
Utah	4,992,003	7	3,924,961	3,450,438	474,523	12.1	69.1
Virginia	34,052,915	33	20,143,802	16,906,425	3,237,377	16.1	49.6
Washington	54,758	2	76,544	52,100	24,444	31.9	95.1
West Virginia	149,191,208	160	149,486,453	118,800,359	30,686,094	20.5	79.6
Wyoming	3,259,793	1	78,880	75,724	3,156	4.0	2.3
Other States [3]	5,296,195	---	---	---	---	---	---
Total	512,088,263	497	419,046,200	332,255,863	86,790,337	20.7	64.9

[1] Included in Tennessee.
[2] Includes Arkansas, Montana (bituminous), and Oklahoma.
[3] Includes Iowa, Maryland, and lignite from Montana, North Dakota, and South Dakota.

kets in relation to the whole, and the trend of shipments to these markets from year to year. The regional and State data reported in this table exclude shipments for United States railroad fuel, vessel fuel, bunker fuel, coal used at mines and sales to employees, overseas exports, and net change in mine inventory because the ultimate destinations of these tonnages are not available. Accordingly, this information, where available, is shown in totals at the end of the table.

Table 63 shows the quantitative changes in total tons shipped, expressed in indexes, that took place throughout the country, by geographic division, State of destination, and consumer use, for the years 1957 and 1961 through 1965. The year 1957 is the base year, representing 100. For example, 1957 (base year) shipments of bituminous coal and lignite in the United States amounted to 493,895,000 tons. Total shipments in 1961 represented only 81.6 percent of the 1957 level, while in 1962 total shipments, compared with 1957 figures, amounted to 86.0 percent. In 1965 they represented 103.8 percent.

To indicate the size of the bituminous coal and lignite market, quantitatively, in each geographic division, State, and consumer use category, the 1957 total tons shipped are shown in the table in lieu of the index numbers of 100 which each tonnage figure represents (except those otherwise noted).

These distribution data are based on reports submitted to the Bureau of Mines voluntarily by producers, sales agents, distributors, and wholesalers who normally produce or sell 100,000 tons or more annually. The unprecedented cooperation of these respondents resulted in their reporting about 94 percent of all coal produced or shipped. To account for total industry shipments, estimates for the remaining shipments are included, based on data from coal trade and other reliable coal statistical reporting agencies.

Details of the bituminous coal and lignite distribution for 1965 are presented in a Bureau of Mines report.[5]

[5] Bureau of Mines. Bituminous Coal and Lignite Distribution Calendar Year 1965. Mineral Industry Surveys, March 1966, 21 pp.

Table 44.—Mechanical cleaning of bituminous coal and lignite in the United States, by types of equipment

Year	Wet methods: Jigs	Wet methods: Concentrating tables	Wet methods: Classifiers	Wet methods: Launders	Wet methods: Dense-medium processes	Wet methods: Unclassified [1]	Wet methods: Total	Pneumatic methods	Grand total
	CLEAN COAL (THOUSAND NET TONS)								
1938	27,615	984	4,521	10,681	4,450	4,936	53,187	10,268	63,455
1939	37,056	1,402	5,917	12,809	4,683	5,867	67,734	11,695	79,429
1940	47,064	2,330	7,762	16,269	6,692	7,173	87,290	14,980	102,270
1941	53,287	2,510	8,177	16,954	9,344	10,106	100,378	17,162	117,540
1942	66,876	3,138	10,529	18,658	12,495	10,304	122,000	20,187	142,187
1943	66,092	2,929	11,854	17,424	13,388	12,688	124,375	21,201	145,576
1944	74,175	2,753	14,780	19,686	13,869	13,400	138,663	20,064	158,727
1945	68,609	2,594	14,203	18,980	12,875	13,209	130,470	17,416	147,886
1946	64,702	1,447	13,883	16,021	14,173	11,833	122,059	16,611	138,670
1947	85,931	2,980	14,648	17,902	17,702	16,920	156,083	18,353	174,436
1948	87,506	4,360	18,304	16,788	20,638	17,068	164,664	16,216	180,880
1949	72,423	4,040	14,865	11,238	17,821	20,321	140,708	12,944	153,652
1950	94,161	4,693	18,059	11,630	28,948	25,679	183,170	15,529	198,699
1951	101,746	5,811	23,174	10,362	33,840	46,497	221,430	18,580	240,010
1952	97,336	3,723	19,296	11,738	31,321	45,205	208,619	18,646	227,265
1953	101,001	4,002	18,312	11,988	36,805	50,386	222,494	19,265	241,759
1954	99,913	6,606	16,115	12,156	43,104	36,143	214,037	18,727	232,764
1955	114,538	7,443	17,656	11,400	49,332	52,051	252,420	20,295	272,715
1956	124,858	9,535	15,064	10,223	56,937	51,437	268,054	24,311	292,365
1957	133,844	14,389	14,282	8,306	63,678	44,760	279,259	24,768	304,027
1958	115,321	18,142	8,793	6,768	52,735	38,394	240,153	18,882	259,035
1959	126,836	27,453	8,935	7,305	66,951	14,058	251,538	18,249	269,787
1960	136,633	30,741	11,012	7,561	66,251	2,832	255,030	18,139	273,169
1961	133,360	30,158	9,263	6,529	65,148	2,562	247,020	17,691	264,711
1962	136,879	31,859	5,681	5,986	68,565	3,959	252,929	18,704	271,633
1963	142,540	37,492	5,558	5,221	74,177	4,539	269,527	19,935	289,462
1964	145,918	40,878	6,725	6,000	84,159	5,123	288,803	21,400	310,203
1965	151,541	43,197	5,844	4,801	94,636	6,853	306,872	25,384	332,256
	PERCENTAGE CLEANED								
1938	43.5	1.6	7.1	16.8	7.0	7.8	83.8	16.2	100.0
1939	46.6	1.8	7.5	16.1	5.9	7.4	85.3	14.7	100.0
1940	46.0	2.3	7.6	15.9	6.5	7.0	85.3	14.7	100.0
1941	45.3	2.2	7.0	14.4	7.9	8.6	85.4	14.6	100.0
1942	47.0	2.2	7.4	13.1	8.8	7.3	85.8	14.2	100.0
1943	45.4	2.0	8.1	12.0	9.2	8.7	85.4	14.6	100.0
1944	46.7	1.8	9.3	12.4	8.8	8.4	87.4	12.6	100.0
1945	46.4	1.8	9.6	12.8	8.7	8.9	88.2	11.8	100.0
1946	46.7	1.0	10.0	11.6	10.2	8.5	88.0	12.0	100.0
1947	49.3	1.7	8.4	10.3	10.1	9.7	89.5	10.5	100.0
1948	48.4	2.4	10.1	9.3	11.4	9.4	91.0	9.0	100.0
1949	47.1	2.6	9.7	7.3	11.6	13.3	91.6	8.4	100.0
1950	47.4	2.4	9.1	5.8	14.6	12.9	92.2	7.8	100.0
1951	42.4	2.4	9.7	4.3	14.1	19.4	92.3	7.7	100.0
1952	42.8	1.6	8.5	5.2	13.8	19.9	91.8	8.2	100.0
1953	41.8	1.6	7.6	4.9	15.2	20.9	92.0	8.0	100.0
1954	42.8	3.0	5.7	3.9	21.8	17.9	95.1	4.9	100.0
1955	42.0	2.7	6.5	4.2	18.1	19.1	92.6	7.4	100.0
1956	42.7	3.3	5.1	3.5	19.5	17.6	91.7	8.3	100.0
1957	44.0	4.8	4.7	2.7	21.0	14.7	91.9	8.1	100.0
1958	44.5	7.0	3.4	2.6	20.4	14.8	92.7	7.3	100.0
1959	47.0	10.2	3.3	2.7	24.8	5.2	93.2	6.8	100.0
1960	50.0	11.3	4.0	2.8	24.3	1.0	93.4	6.6	100.0
1961	50.4	11.4	3.5	2.4	24.6	1.0	93.3	6.7	100.0
1962	50.4	11.7	2.1	2.2	25.2	1.5	93.1	6.9	100.0
1963	49.2	13.0	1.9	1.8	25.6	1.6	93.1	6.9	100.0
1964	47.0	13.2	2.2	1.9	27.1	1.7	93.1	6.9	100.0
1965	45.6	13.0	1.8	1.4	28.5	2.1	92.4	7.6	100.0

[1] Of the total unclassified tonnage in 1960, 1,826,000 net tons was cleaned by flotation. In 1961–65, all of the tonnage under "Unclassified" was cleaned by flotation.

Table 45.—Mechnical cleaning at bituminous coal and lignite mines in the United States, by underground, strip, and auger mining

Year	Total production (net tons)	Cleaned: Net tons	Cleaned: Percent	Total production (net tons)	Cleaned: Net tons	Cleaned: Percent
	Underground mine			Strip mine		
1953	349,550,972	194,934,599	55.8	105,448,569	46,202,508	43.8
1954	289,112,031	184,372,053	63.8	98,134,250	47,772,295	48.7
1955	343,465,239	217,199,126	63.2	115,092,769	54,423,341	47.3
1956	365,774,043	232,231,914	63.5	127,055,382	58,271,513	45.9
1957	360,649,141	242,981,446	67.4	124,108,538	59,317,324	47.8
1958	286,884,244	198,710,828	69.3	116,241,787	58,932,257	50.7
1959	283,433,655	203,829,017	71.9	120,953,334	64,417,972	53.3
1960	284,888,310	205,804,076	72.2	122,629,664	66,356,125	54.1
1961	272,765,985	199,359,507	73.1	121,979,084	64,500,929	52.9
1962	281,266,368	200,662,784	71.3	130,300,224	69,489,985	53.3
1963	302,256,400	215,717,996	71.4	144,140,677	72,032,483	50.0
1964	321,807,914	231,997,577	72.1	151,858,979	76,339,834	50.3
1965	332,661,236	251,673,749	75.7	165,240,769	78,126,001	47.3
	Auger mines			Total, all mines		
1953	2,290,908	621,470	27.1	457,290,449	241,758,577	52.9
1954	4,460,019	619,675	13.9	391,706,300	232,764,023	59.4
1955	6,075,400	1,093,017	18.0	464,633,408	272,715,484	58.7
1956	8,044,652	1,861,957	23.1	500,874,077	292,365,384	58.4
1957	7,946,237	1,728,424	21.8	492,703,916	304,027,194	61.7
1958	7,319,516	1,391,766	19.0	410,445,547	259,034,851	63.1
1959	7,640,513	1,539,698	20.2	412,027,502	269,786,687	65.5
1960	7,994,373	1,008,493	12.6	415,512,347	273,168,694	65.7
1961	8,231,733	850,506	10.3	402,976,802	264,710,942	65.7
1962	10,582,733	1,479,830	14.0	422,149,325	271,632,599	64.3
1963	12,531,098	1,711,926	13.7	458,928,175	289,462,405	63.1
1964	13,331,059	1,865,331	14.0	486,997,952	310,202,742	63.7
1965	14,186,258	2,456,113	17.3	512,088,263	332,255,863	64.9

Table 46.—Mechanical cleaning at bituminous coal and lignite mines in the United States, 1965, by States and by underground, strip, and auger mining

State	Underground mines			Strip mines			Auger mines			Total, all mines		
	Total production (net tons)	Cleaned		Total production (net tons)	Cleaned		Total production (net tons)	Cleaned		Total production (net tons)	Cleaned	
		Net tons	Percent		Net tons	Percent		Net tons	Percent		Net tons	Percent
Alabama	9,922,627	9,159,828	92.3	4,808,844	2,132,279	44.3	100,121	42,410	42.4	14,831,592	11,334,517	76.4
Alaska	---	---	---	893,182	378,419	42.4	---	---	---	893,182	378,419	42.4
Arkansas	74,295	(1)	(1)	151,593	(1)	(1)	(1)	(1)	(1)	225,888	(1)	(1)
Colorado	3,520,329	1,700,260	48.3	1,270,129	5,258	.4	---	---	---	4,790,458	1,705,518	35.6
Illinois	25,813,625	20,702,614	80.2	32,669,583	27,395,054	83.9	---	---	---	58,483,208	48,097,668	82.2
Indiana	2,355,307	2,026,536	86.0	13,210,102	10,367,108	78.5	---	---	---	15,565,409	12,393,644	79.6
Kansas	---	---	---	1,309,744	1,290,089	98.5	---	---	---	1,309,744	1,290,089	98.5
Kentucky	50,688,234	26,880,226	53.0	30,142,599	18,155,761	60.2	4,934,878	12,910	.3	85,765,711	45,048,897	52.5
Missouri	25,701	---	---	3,538,042	2,003,998	56.6	---	---	---	3,563,743	2,003,998	56.2
Montana (bituminous)	61,044	(1)	(1)	2,144	(1)	(1)	(1)	(1)	(1)	63,188	(1)	(1)
New Mexico	434,320	421,262	97.0	2,777,593	---	---	---	---	---	3,211,913	421,262	13.1
Ohio	11,267,581	7,463,273	66.2	26,364,829	6,567,954	24.9	1,757,311	277,930	15.8	39,389,721	14,309,157	36.3
Oklahoma	8,832	(1)	(1)	964,061	(1)	(1)	1,119	(1)	(1)	974,012	(1)	(1)
Pennsylvania	55,674,900	48,501,996	87.1	23,767,438	6,943,018	29.2	866,111	255,047	29.4	80,308,449	55,700,061	69.4
Tennessee	3,581,134	[2] 103,095	[2] 2.8	2,066,777	[2] 183,373	[2] 5.8	217,262	[2] 1,119	[2] .5	5,865,173	[2] 287,587	[2] 4.0
Utah	4,992,003	3,450,438	69.1	---	---	---	---	---	---	4,992,003	3,450,438	69.1
Virginia	29,365,189	15,983,447	54.4	3,080,742	651,098	21.1	1,606,984	271,880	16.9	34,052,915	16,906,425	49.6
Washington	52,100	52,100	100.0	2,658	---	---	---	---	---	54,758	52,100	95.1
West Virginia	134,064,281	115,152,950	85.9	10,462,246	2,052,592	19.6	4,664,681	1,594,817	34.2	149,191,208	118,800,359	79.6
Wyoming	123,838	75,724	61.1	3,135,955	---	---	---	---	---	3,259,793	75,724	2.3
Other States [3]	635,896	---	---	4,622,508	---	---	37,791	---	---	5,296,195	---	---
Total	332,661,236	251,673,749	75.7	165,240,769	78,126,001	47.3	14,186,258	2,456,113	17.3	512,088,263	332,255,863	64.9

[1] Included in Tennessee.
[2] Includes Arkansas, Montana (bituminous), and Oklahoma.
[3] Includes Iowa, Maryland, and lignite from Montana, North Dakota, and South Dakota.

MECHANICAL CRUSHING

Table 47.—Mechanical crushing of bituminous coal and lignite at mines in the United States [1]

Year	Number of plants crushing coal	Coal crushed (net tons)	Percentage of total production crushed	Year	Number of plants crushing coal	Coal crushed (net tons)	Percentage of total production crushed
1940	716	35,251,061	7.7	1954	982	122,288,369	31.2
1944	814	66,460,564	10.8	1955	1,225	161,470,318	34.8
1945	830	70,936,898	12.3	1956	1,370	172,389,802	34.4
1946	851	66,663,732	12.5	1957	1,452	173,098,257	35.0
1947	904	88,985,858	14.1	1958	1,359	146,749,108	35.8
1948	995	91,564,311	15.3	1959	1,393	151,225,633	36.7
1949	1,120	77,327,691	17.7	1960	1,348	160,875,418	38.7
1950	1,210	101,594,731	19.7	1961	1,217	146,765,297	36.4
1951	1,374	118,663,712	22.2	1962	1,202	159,654,414	37.8
1952	1,325	108,102,158	23.2	1963	1,288	183,006,848	39.9
1953	1,239	116,493,415	25.5	1964	1,293	209,119,640	42.9
				1965	1,094	234,563,123	45.8

[1] Data not available for 1941–43. Lignite and Virginia semianthracite mines are not included in 1940–49.

Table 48.—Mechanical crushing of bituminous coal and lignite at mines in the United States, by States

State	Number of plants crushing coal		Coal crushed (net tons)		Percentage of total production crushed	
	1964	1965	1964	1965	1964	1965
Alabama	20	28	6,271,769	6,791,656	43.4	45.8
Alaska	3	2	471,206	570,054	63.3	63.8
Arkansas	7	7	186,719	195,313	87.9	86.5
Colorado	45	42	1,939,561	2,289,972	44.5	47.8
Illinois	76	74	27,131,051	29,423,246	49.3	50.3
Indiana	30	37	10,433,882	11,984,741	69.2	77.0
Iowa	21	20	777,349	818,108	79.9	78.4
Kansas	2	2	903,243	849,689	71.5	64.9
Kentucky	119	115	28,769,974	34,538,119	34.8	40.3
Maryland	10	11	225,153	327,513	19.8	27.1
Missouri	9	8	3,153,109	3,000,632	96.9	84.2
Montana:						
Bituminous	6	6	16,799	18,175	36.6	28.9
Lignite	1	1	293,117	296,554	97.7	98.4
Total Montana	7	7	309,916	314,729	89.6	86.4
New Mexico	4	4	2,945,102	3,196,855	99.2	99.5
North Dakota (lignite)	14	15	2,041,288	1,996,272	77.4	73.1
Ohio	131	111	18,222,543	20,255,370	48.8	51.4
Oklahoma	8	8	763,261	788,365	74.2	80.9
Pennsylvania	312	214	38,750,879	41,823,817	50.6	52.1
South Dakota (lignite)	1	1	5,200	4,000	40.0	40.0
Tennessee	17	22	1,552,276	2,346,645	25.9	40.0
Utah	34	30	3,419,829	3,615,091	72.5	72.4
Virginia	40	54	11,276,995	11,885,468	35.6	34.9
Washington	4	3	7,084	4,963	10.4	9.1
West Virginia	365	270	46,601,370	54,444,544	33.0	36.5
Wyoming	14	9	2,960,881	3,097,961	95.5	95.0
Total	1,293	1,094	209,119,640	234,563,123	42.9	45.8

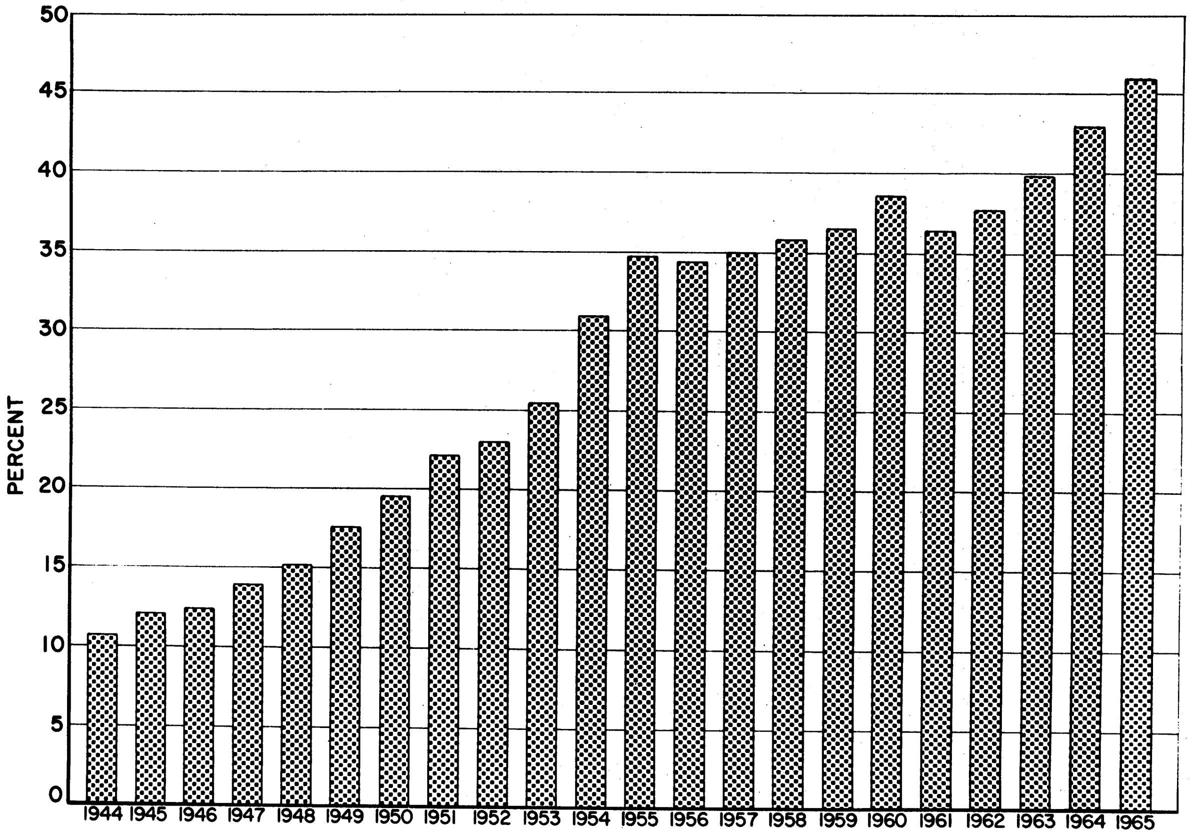

Figure 10.—Percentage of total production of bituminous coal and lignite crushed at mines in the United States, 1944–65.

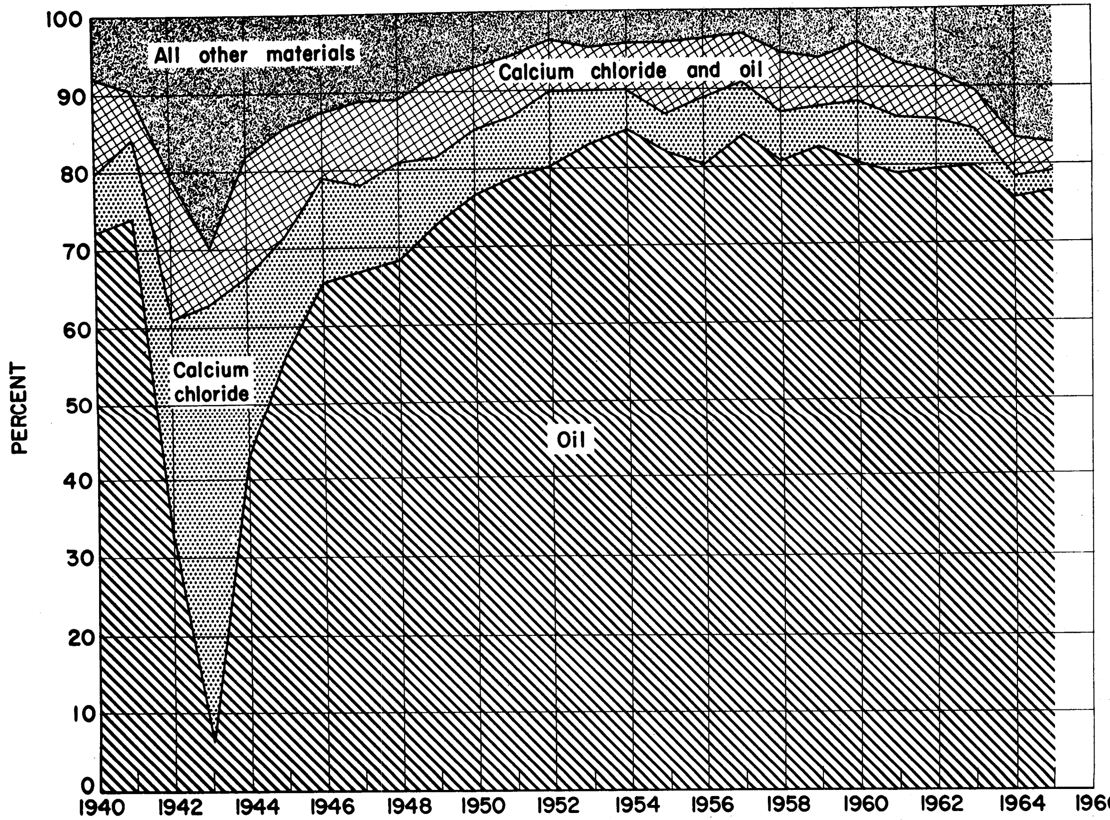

Figure 11.—Percentage of total bituminous coal and lignite treated for allaying dust at mines in the United States, 1940–65, by type of agent used.

TREATMENT FOR ALLAYING DUST

Table 49.—Treatment of bituminous coal and lignite at mines for allaying dust in the United States [1]

Year	Grand total production (net tons)	Percentage of total production treated	Net tons treated with— Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total
1940	460,771,500	7.7	2,633,291	25,767,651	4,428,113	2,807,728	35,636,783
1941	514,149,245	7.7	3,957,459	29,258,462	2,482,899	3,844,476	39,543,296
1942	582,692,937	6.0	10,132,809	11,302,020	6,544,658	7,148,064	35,127,551
1943	590,177,069	4.5	15,049,176	1,720,176	1,947,219	7,966,484	26,683,055
1944	619,576,240	5.0	7,276,702	13,188,883	4,744,580	5,562,565	30,772,730
1945	577,617,327	5.8	5,115,090	18,875,674	4,647,872	4,910,602	33,549,238
1946	533,922,068	6.9	4,957,622	24,310,109	3,193,070	4,572,360	37,033,161
1947	630,623,722	8.2	5,822,483	34,667,571	5,571,953	5,732,101	51,794,108
1948	599,518,229	8.4	6,275,121	34,466,534	4,177,987	5,462,054	50,381,696
1949	437,868,036	9.5	3,670,120	30,448,670	4,380,961	3,275,151	41,774,902
1950	516,311,053	10.5	4,643,186	41,688,159	4,278,212	3,724,314	54,333,871
1951	533,664,732	11.0	4,694,938	46,142,726	4,587,940	3,172,205	58,597,809
1952	466,840,782	11.0	4,954,080	41,409,886	3,432,199	1,772,111	51,568,276
1953	457,290,449	10.7	3,362,552	40,671,431	2,769,833	2,154,985	48,958,801
1954	391,706,300	14.4	2,959,979	47,782,165	3,366,955	2,255,872	56,364,971
1955	464,633,408	13.5	3,160,729	51,157,769	5,696,447	2,513,752	62,528,697
1956	500,874,077	12.9	5,500,522	52,008,545	4,912,374	2,309,732	64,731,173
1957	492,703,916	12.5	4,112,934	52,051,076	3,809,132	1,852,051	61,825,193
1958	410,445,547	13.0	3,359,434	42,922,129	4,122,397	2,862,670	53,266,630
1959	412,027,502	13.3	2,716,638	45,139,888	3,419,852	3,403,320	54,679,698
1960	415,512,347	13.9	4,576,176	46,241,261	4,333,350	2,469,508	57,620,295
1961	402,976,802	12.3	3,616,536	39,130,370	3,448,677	3,385,980	49,581,563
1962	422,149,325	11.8	3,128,468	39,822,318	3,025,489	4,047,823	50,024,098
1963	458,928,175	11.1	2,405,209	40,834,328	2,674,714	5,254,795	51,169,046
1964	486,997,952	10.7	1,413,348	39,578,713	2,641,817	8,680,431	52,314,309
1965	512,088,263	10.4	1,357,945	40,609,603	1,852,055	9,197,697	53,017,300

	Number of plants treating with—					Percentage of tonnage treated with—				
	Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total [2]	Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total
1940	51	486	22	62	614	7.4	72.3	12.4	7.9	100.0
1941	67	564	15	58	668	10.0	74.0	6.3	9.7	100.0
1942	167	334	73	117	603	28.8	32.2	18.6	20.4	100.0
1943	212	67	28	101	393	56.4	6.4	7.3	29.9	100.0
1944	145	192	47	83	434	23.6	42.9	15.4	18.1	100.0
1945	105	296	43	67	487	15.2	56.3	13.9	14.6	100.0
1946	79	380	41	51	546	13.4	65.6	8.6	12.4	100.0
1947	67	384	58	45	546	11.2	66.9	10.8	11.1	100.0
1948	68	474	48	46	629	12.5	68.4	8.3	10.8	100.0
1949	91	586	62	34	769	8.8	72.9	10.5	7.8	100.0
1950	106	688	32	45	838	8.5	76.7	7.9	6.9	100.0
1951	98	764	40	27	898	8.0	78.8	7.8	5.4	100.0
1952	101	723	30	20	865	9.6	80.3	6.7	3.4	100.0
1953	81	681	28	26	785	6.8	83.1	5.7	4.4	100.0
1954	83	614	29	29	737	5.2	84.8	6.0	4.0	100.0
1955	63	650	33	28	757	5.1	81.8	9.1	4.0	100.0
1956	73	642	35	30	763	8.5	80.3	7.6	3.6	100.0
1957	71	665	31	34	785	6.6	84.2	6.2	3.0	100.0
1958	60	596	36	33	720	6.3	80.6	7.7	5.4	100.0
1959	54	615	44	37	743	5.0	82.6	6.2	6.2	100.0
1960	64	635	56	26	748	7.9	80.3	7.5	4.3	100.0
1961	48	544	32	32	643	7.3	78.9	7.0	6.8	100.0
1962	36	534	32	44	638	6.3	79.6	6.0	8.1	100.0
1963	32	579	24	35	661	4.7	79.8	5.2	10.3	100.0
1964	19	505	29	41	603	2.7	75.7	5.0	16.6	100.0
1965	15	459	11	40	525	2.6	76.6	3.5	17.3	100.0

[1] All items except "Grand total production" exclude lignite and semianthracite, 1940–49. Data for 1940–45 include all mines with an average daily production of 50 tons and all mines with rail or river connections regardless of size. Data for 1946–65 include all mines producing 1,000 or more tons. The figures are reasonably comparable for all years.

[2] Because some mines used more than one method of treatment, this total is not the sum of the individual items.

Table 50.—Treatment of bituminous coal and lignite at mines for allaying dust in the United States, by States

State	Number of mines treating coal		Coal treated (net tons)		Percentage of total production treated	
	1964	1965	1964	1965	1964	1965
Alabama	3	2	57,935	60,632	0.4	0.4
Colorado	37	36	216,911	212,923	5.0	4.4
Illinois	63	59	4,874,180	5,450,007	8.9	9.3
Indiana	19	26	1,285,781	1,131,588	8.5	7.3
Iowa	4	3	7,969	6,150	.8	.6
Kansas	3	3	38,053	21,378	3.0	1.6
Kentucky	78	58	7,540,336	8,301,749	9.1	9.7
Maryland	1	1	9,000	13,390	.8	1.1
Missouri	4	2	34,914	23,660	1.1	.7
Montana:						
Bituminous	6	6	19,434	20,082	42.3	31.9
Lignite	---	---	---	---	---	---
Total Montana	6	6	19,434	20,082	5.6	5.5
New Mexico	3	3	2,543,176	2,771,593	85.6	86.3
North Dakota (lignite)	17	19	462,654	485,532	17.5	17.8
Ohio	35	33	4,654,481	4,921,475	12.5	12.5
Oklahoma	3	3	26,000	23,000	2.5	2.4
Pennsylvania	89	63	7,229,421	7,911,721	9.4	9.9
South Dakota (lignite)	1	1	5,200	4,000	40.0	40.0
Tennessee	1	3	20,000	16,058	.3	.3
Utah	28	23	1,001,697	902,784	21.2	18.1
Virginia	25	29	2,356,665	3,016,093	7.4	8.9
West Virginia	173	128	19,711,692	17,571,465	13.9	11.8
Wyoming	10	8	218,810	152,020	7.1	4.7
Total	603	509	52,314,309	53,017,300	10.7	10.4

Table 51.—Thermal drying of bituminous coal and lignite in the United States, by type of drying equipment

Type of drier	Number of thermal drying units		Thermally dried (net tons)		Percentage of total	
	1964	1965	1964	1965	1964	1965
Continuous carrier	4	4	866,350	762,322	1.5	1.2
Fluidized-bed	49	57	22,478,004	27,331,871	38.3	41.8
Multilouver	42	46	9,943,032	12,334,291	16.9	18.9
Rotary	9	8	1,959,496	1,532,340	3.3	2.3
Screen	52	48	8,792,615	8,123,116	15.0	12.4
Suspension or flash	49	46	9,154,519	10,434,967	15.6	16.0
Vertical tray and cascade	50	42	5,507,522	4,842,692	9.4	7.4
Total	255	251	58,701,538	65,361,599	100.0	100.0

Table 52.—Comparison of thermal drying of bituminous coal and lignite with mechanical cleaning at mines in the United States, by States

State	Cleaning plants, number: Total		Cleaning plants, number: With thermal drying		Production mechanically cleaned (net tons)		Thermally dried (net tons)		Percentage of cleaned coal thermally dried	
	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965
Illinois	56	49	26	25	47,973,098	48,097,668	10,188,039	10,841,774	21.2	22.5
Indiana	15	15	11	10	11,597,770	12,393,644	3,549,268	3,338,462	30.6	26.9
Kentucky	63	60	6	8	42,107,116	45,048,897	1,918,723	2,617,219	4.6	5.8
North Dakota (lignite)	---	---	---	4	---	---	150,484	272,600	---	---
Ohio	22	22	8	9	14,201,262	14,309,157	3,060,169	3,465,216	21.5	24.2
Pennsylvania	97	101	15	17	52,196,058	55,700,061	6,927,992	8,144,995	13.3	14.6
Utah	8	7	4	3	3,192,444	3,450,438	1,211,752	1,080,345	38.0	31.3
Virginia	28	33	4	5	13,270,816	16,906,425	3,327,882	5,937,709	25.1	35.1
West Virginia	154	160	54	52	108,203,720	118,800,359	28,367,229	29,663,279	26.2	25.0
Other States	52	50	---	---	17,460,458	17,549,214	---	---	---	---
Total	495	497	128	133	310,202,742	332,255,863	58,701,538	65,361,599	[1] 18.9	[1] 19.7

[1] Excludes North Dakota.

Table 53.—Thermal drying of bituminous coal and lignite at mines in the United States, by States

State	Number of thermal drying units		Grand total production (net tons)		Thermally dried (net tons)		Percentage of total production thermally dried	
	1964	1965	1964	1965	1964	1965	1964	1965
Illinois	56	53	55,022,602	58,483,208	10,188,039	10,841,774	18.5	18.5
Indiana	29	22	15,074,631	15,565,409	3,549,268	3,338,462	23.5	21.4
Kentucky	9	11	82,747,171	85,765,711	1,918,723	2,617,219	2.3	3.1
North Dakota (lignite)	3	4	2,636,751	2,731,935	150,484	272,600	5.7	10.0
Ohio	19	20	37,310,377	39,389,721	3,060,169	3,465,216	11.2	8.8
Pennsylvania	23	26	76,530,758	80,308,449	6,927,992	8,144,995	9.1	10.1
Utah	4	4	4,719,843	4,992,003	1,211,752	1,080,345	25.7	21.6
Virginia	16	17	31,653,484	34,052,915	3,327,882	5,937,709	10.5	17.4
West Virginia	96	94	141,408,498	149,191,208	28,367,229	29,663,279	20.1	19.9
Other States	---	---	39,893,837	41,607,704	---	---	---	---
Total	255	251	486,997,952	512,088,263	58,701,538	65,361,599	12.1	12.8

Table 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1965, by States and counties

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
ALABAMA									
Bibb	32,150	170,890	---	203,040	$4.66	52	195	10,121	20.06
Blount	---	53,384	---	53,384	5.05	40	91	3,646	14.64
Cullman	---	4,393	---	4,393	7.21	9	98	879	5.00
Etowah	134,227	---	---	134,227	5.30	26	314	8,185	16.40
Jackson	258,952	13,467	---	272,419	3.68	140	116	16,273	16.74
Jefferson	6,599,852	729,808	370	7,330,030	8.01	3,278	210	687,874	10.66
Marion	160,206	317,159	---	477,365	3.87	325	208	67,737	7.05
St. Clair	---	35,000	---	35,000	4.23	9	140	1,270	27.55
Shelby	622,585	52,166	---	674,751	9.03	263	259	68,226	9.89
Tuscaloosa	892,160	295,559	31	1,187,750	4.34	156	281	43,853	27.08
Walker	3,074,586	800,532	430,388	4,305,506	7.09	945	226	213,119	20.20
Winston	60,000	93,727	---	153,727	5.00	43	238	10,214	15.05
Total Alabama	11,834,718	2,566,085	430,789	14,831,592	7.16	5,286	214	1,131,397	13.11
ALASKA									
Total Alaska	877,660	12,984	2,538	893,182	6.82	217	251	54,462	16.40
ARKANSAS									
Franklin	87,492	---	---	87,492	6.97	20	171	3,427	25.53
Johnson	128,521	141	---	128,662	7.48	78	193	15,024	8.56
Sebastian	9,734	---	---	9,734	7.30	11	154	1,691	5.76
Total Arkansas	225,747	141	---	225,888	7.27	109	185	20,142	11.21
COLORADO									
Delta	W	W	W	W	W	W	W	W	W
Fremont	2,344	279,962	25	282,331	3.85	87	228	19,803	14.26
Garfield	---	6,975	---	6,975	8.30	8	221	1,673	4.17
Gunnison	258,914	43,343	2,504	304,761	5.79	125	207	25,893	11.77
Huerfano	974	47,305	---	48,279	6.25	39	210	8,155	5.92
La Plata	---	26,024	---	26,024	4.71	20	180	3,565	7.30
Las Animas	W	W	W	W	W	W	W	W	W
Mesa	---	24,218	89,172	113,390	5.34	45	198	8,985	12.62

Moffat	W	W	W	W	W	W	W	W	W
Montrose	W	W	W	W	W	W	W	W	W
Pitkin	W	W	W	W	W	W	W	W	W
Rio Blanco	---	6,110	---	6,110	6.16	6	168	1,059	5.77
Routt	W	W	W	W	W	W	W	W	W
Weld	463,602	234,296	6,527	704,425	4.14	265	178	47,087	14.96
Other counties	2,920,861	374,403	2,899	3,298,163	5.32	976	224	218,237	15.11
Total Colorado	3,646,695	1,042,636	101,127	4,790,458	5.10	1,571	213	334,457	14.32
ILLINOIS									
Adams	---	26,352	168	26,520	6.94	16	161	2,577	10.29
Christian	W	W	W	W	W	W	W	W	W
Douglas	W	W	W	W	W	W	W	W	W
Franklin	W	W	W	W	W	W	W	W	W
Fulton	6,769,248	506,347	7,114	7,282,709	3.94	745	294	219,095	33.24
Gallatin	88,962	6,466	---	95,428	2.68	60	121	7,257	13.15
Greene	---	5,544	6	5,550	3.77	2	288	577	9.62
Grundy	W	W	W	W	W	W	W	W	W
Henry	W	W	W	W	W	W	W	W	W
Jackson	W	W	W	W	W	W	W	W	W
Jefferson	W	W	W	W	W	W	W	W	W
Johnson	W	W	W	W	W	W	W	W	W
Knox	W	W	W	W	W	W	W	W	W
Logan	---	15,822	60	15,882	5.00	23	123	2,821	5.63
Macoupin	253,855	122,615	2,509	378,979	4.14	156	224	34,833	10.88
Menard	W	W	W	W	W	W	W	W	W
Mercer	14,528	9,142	15	23,685	5.20	14	170	2,457	9.64
Montgomery	W	W	W	W	W	W	W	W	W
Peoria	1,004,697	297,284	198	1,302,179	4.73	141	291	40,999	31.76
Perry	6,361,484	137,982	4,372	6,503,838	3.26	394	309	121,635	53.47
Randolph	W	W	W	W	W	W	W	W	W
St. Clair	3,819,888	1,901,956	75	5,721,919	3.49	488	259	126,162	45.35
Saline	4,651,143	20,773	6,371	4,678,287	3.73	891	226	201,219	23.25
Schuyler	W	W	W	W	W	W	W	W	W
Stark	W	W	W	W	W	W	W	W	W
Vermilion	W	W	W	W	W	W	W	W	W
Washington	W	W	W	W	W	W	W	W	W
Will	W	W	W	W	W	W	W	W	W
Williamson	5,530,282	484,336	7,638	6,022,256	3.75	1,185	246	292,007	20.62
Other counties	24,080,134	1,937,552	408,290	26,425,976	3.81	4,181	251	1,048,786	25.20
Total Illinois	52,574,221	5,472,171	436,816	58,483,208	3.74	8,296	253	2,100,425	27.84
INDIANA									
Clay	319,385	514,092	1,952	835,429	3.92	146	247	36,181	23.09
Daviess	---	27,088	---	27,088	4.98	12	214	2,570	10.54
Dubois	W	W	W	W	W	W	W	W	W
Fountain	W	W	W	W	W	W	W	W	W

See footnotes at end of table.

Table 54.—Production, value, men working daily, days active, man-days and output per man per day at bituminous coal and lignite mines in the United States, 1965, by States and counties—Continued

County	Production (net tons): Shipped by rail or water [1]	Production (net tons): Shipped by truck	Production (net tons): Used at mine [2]	Production (net tons): Total	Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
INDIANA—Continued									
Gibson	W	W	W	W	W	W	W	W	W
Greene	1,001,966	172,334	---	1,174,300	$4.00	195	186	36,347	32.31
Knox	W	W	W	W	W	W	W	W	W
Owen	W	W	W	W	W	W	W	W	W
Parke	---	7,032	---	7,032	5.93	12	229	2,747	2.56
Perry	W	W	W	W	W	W	W	W	W
Pike	1,671,896	136,546	555	1,808,997	3.81	222	257	57,129	31.67
Spencer	11,010	47,946	---	58,956	4.32	22	188	4,083	14.44
Sullivan	2,235,221	162,470	1,152,420	3,550,111	3.89	712	197	140,173	25.33
Vermillion	---	10,491	---	10,491	6.57	42	50	2,098	5.00
Vigo	W	W	W	W	W	W	W	W	W
Warrick	6,036,098	431,335	3,672	6,471,105	3.71	656	200	131,045	49.38
Other counties	1,184,077	416,686	21,137	1,621,900	4.15	501	198	99,275	16.34
Total Indiana	12,459,653	1,926,020	1,179,736	15,565,409	3.85	2,520	203	511,648	30.42
IOWA									
Appanoose	3,567	20,766	510	24,843	6.18	75	120	8,979	2.77
Keokuk	4,588	2,119	---	6,707	2.29	9	75	671	10.00
Lucas	45,799	14,309	50	60,158	4.13	22	273	6,016	10.00
Mahaska	302,747	61,768	473	364,988	3.41	59	276	16,301	22.39
Marion	381,467	61,009	21	442,497	3.45	60	270	16,192	27.33
Monroe	1,485	105,085	---	106,570	3.34	17	275	4,678	22.78
Van Buren	---	15,210	30	15,240	4.67	4	144	576	26.45
Wapello	---	22,239	---	22,239	3.55	10	180	1,798	12.37
Total Iowa	739,653	302,505	1,084	1,043,242	3.54	256	216	55,211	18.90
KANSAS									
Bourbon	8,276	1,332	---	9,608	3.70	3	104	312	30.79
Cherokee	W	W	W	W	W	W	W	W	W
Crawford	W	W	W	W	W	W	W	W	W
Other counties	875,136	424,739	261	1,300,136	4.64	227	269	61,068	21.29
Total Kansas	883,412	426,071	261	1,309,744	4.64	230	267	61,380	21.34

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Eastern Kentucky:									
Bell	1,396,631	850,168	350	2,247,149	3.07	952	169	161,079	13.95
Boyd	---	30,269	467	30,736	3.94	13	291	3,785	8.12
Breathitt	405,833	65,000	---	470,833	3.01	222	169	37,613	12.52
Carter	---	19,075	80	19,155	4.06	22	211	4,695	4.08
Clay	758,922	724,057	12	1,482,991	3.98	948	179	169,704	8.74
Clinton	---	11,500	---	11,500	4.06	12	188	2,309	4.98
Elliott	---	8,251	---	8,251	4.46	32	54	1,741	4.74
Floyd	4,255,296	691,804	10,416	4,957,516	5.27	2,705	181	489,376	10.13
Harlan	5,510,091	119,199	5,334	5,634,624	5.16	2,124	205	435,294	12.94
Jackson	---	21,581	---	21,581	4.00	58	66	3,806	5.67
Johnson	173,679	40,413	---	214,092	2.91	262	141	36,994	5.79
Knott	2,271,237	100,446	---	2,371,683	3.14	894	170	151,693	15.63
Knox	35,911	107,453	100	143,464	3.59	228	117	26,628	5.39
Laurel	79,872	11,844	---	91,716	3.23	34	146	4,974	18.44
Lawrence	---	2,800	---	2,800	3.36	9	56	523	5.35
Lee	8,750	15,150	---	23,900	5.00	33	181	6,005	3.98
Leslie	1,778,375	85,626	238	1,864,239	4.17	1,143	166	189,285	9.85
Letcher	5,740,553	34,401	12,772	5,787,726	4.16	1,622	219	355,940	16.26
McCreary	123,266	343,266	---	466,532	3.57	250	206	51,550	9.05
Magoffin	34,006	28,327	---	62,333	3.10	119	75	8,905	7.00
Martin	353,010	53,170	---	406,180	3.23	179	139	24,888	16.32
Morgan	---	62,199	---	62,199	4.60	22	188	4,141	15.02
Owsley	---	3,500	---	3,500	3.00	7	100	700	5.00
Perry	3,520,949	393,189	8,548	3,922,686	4.15	1,201	200	240,622	16.30
Pike	12,377,287	3,027,628	15,207	15,420,122	3.94	6,831	171	1,171,178	13.17
Pulaski	59,789	212,735	---	272,524	4.51	84	189	15,881	17.16
Wayne	---	21,384	---	21,384	2.84	21	80	1,679	12.74
Whitley	458,138	83,092	---	541,230	3.96	528	163	86,240	6.28
Wolfe	---	4,000	---	4,000	4.06	8	100	800	5.00
Total Eastern Kentucky	39,341,595	7,171,527	53,524	46,566,646	4.18	20,563	179	3,688,028	12.63
Western Kentucky:									
Butler	25,000	145,000	---	170,000	3.87	70	181	12,661	13.43
Christian	9,797	26,557	---	36,354	3.64	40	90	3,593	10.12
Daviess	497,563	555,217	---	1,052,780	2.58	91	303	27,529	38.24
Hancock	---	4,000	---	4,000	3.00	8	50	400	10.00
Henderson	67,997	81,887	5,017	154,901	2.58	75	177	13,239	11.70
Hopkins	9,660,482	134,316	120	9,794,918	3.46	1,918	185	354,368	27.64
Muhlenberg	13,718,822	3,894,572	452	17,613,846	3.21	1,256	276	346,549	50.83
Ohio	4,999,554	40,417	---	5,039,971	3.24	367	273	100,369	50.21
Union	5,315,131	---	453	5,315,584	3.61	837	243	203,514	26.12
Webster	10,383	6,328	---	16,711	3.08	18	125	2,258	7.40
Total Western Kentucky	34,304,729	4,888,294	6,042	39,199,065	3.31	4,680	227	1,064,480	36.82
Total Kentucky	73,646,324	12,059,821	59,566	85,765,711	3.78	25,243	188	4,752,508	18.05

See footnotes at end of table.

Table 54.—Production, value, men working daily, days active, man-days and output per man per day at bituminous coal and lignite mines in the United States, 1965, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
MARYLAND									
Allegany	139,415	163,436	---	302,851	$4.18	147	179	26,300	11.52
Garrett	596,482	310,400	---	906,882	3.44	228	219	49,832	18.20
Total Maryland	735,897	473,836	---	1,209,733	3.63	375	203	76,132	15.89
MISSOURI									
Adair	---	22,148	500	22,648	4.74	27	214	5,778	3.92
Boone	W	W	W	W	W	W	W	W	W
Callaway	---	25,821	---	25,821	4.42	9	332	2,989	8.64
Clark	W	W	W	W	W	W	W	W	W
Dade	---	11,660	---	11,660	5.15	6	285	1,720	6.78
Henry	W	W	W	W	W	W	W	W	W
Macon	W	W	W	W	W	W	W	W	W
Putnam	W	W	W	W	W	W	W	W	W
St. Clair	---	1,628	---	1,628	5.00	3	66	198	8.22
Vernon	55,123	6,055	20	61,198	3.72	27	150	4,080	15.00
Other counties	1,740,730	314,640	1,385,418	3,440,788	4.14	324	282	91,220	37.72
Total Missouri	1,795,853	381,952	1,385,938	3,563,743	4.15	396	268	105,985	33.62
MONTANA									
Bituminous coal:									
Big Horn	---	1,093	---	1,093	7.50	1	93	93	13.20
Blaine	W	W	W	W	W	W	W	W	W
Carbon	18,397	7,169	118	25,684	6.72	28	159	4,375	5.87
Musselshell	---	32,050	180	32,230	7.48	25	173	4,303	7.49
Rosebud	W	W	W	W	W	W	W	W	W
Other counties	---	3,130	1,051	4,181	8.64	11	139	1,525	2.74
Total bituminous coal	18,397	43,442	1,349	63,188	7.24	65	158	10,296	6.14
Lignite:									
Custer	W	W	W	W	W	W	W	W	W
Powder River	---	1,265	5	1,270	5.35	1	138	139	9.16
Richland	W	W	W	W	W	W	W	W	W
Other counties	296,554	3,461	---	300,015	1.95	22	207	4,545	66.01
Total lignite	296,554	4,726	5	301,285	1.96	23	204	4,684	64.32
Total Montana	314,951	48,168	1,354	364,473	2.88	88	170	14,980	24.33

See footnotes at end of table.

NEW MEXICO

Colfax	W	W	W	W	W	W	W	W	W
McKinley	W	W	W	W	W	W	W	W	W
San Juan	W	W	W	W	W	W	W	W	W
Other counties	793,102	2,411,040	7,771	3,211,913	3.33	280	233	65,373	49.13
Total New Mexico	793,102	2,411,040	7,771	3,211,913	3.33	280	233	65,373	49.13

NORTH DAKOTA (LIGNITE)

Adams	9,980	7,408	---	17,388	4.26	3	232	584	29.77
Bowman	W	W	W	W	W	W	W	W	W
Burke	W	W	W	W	W	W	W	W	W
Burleigh	---	7,327	---	7,327	3.38	3	190	570	12.85
Dunn	---	1,000	58	1,058	3.00	2	20	29	36.00
Grant	---	19,515	---	19,515	3.10	6	180	1,002	19.48
Hettinger	---	2,500	---	2,500	2.80	1	120	120	20.83
McLean	---	46,038	---	46,038	3.52	6	299	1,842	25.00
Mercer	W	W	W	W	W	W	W	W	W
Morton	---	18,924	105	19,029	2.90	13	101	1,290	14.75
Oliver	---	3,323	---	3,323	2.72	1	140	140	23.73
Stark	W	W	W	W	W	W	W	W	W
Ward	W	W	W	W	W	W	W	W	W
Williams	---	5,212	---	5,212	4.15	5	84	422	12.35
Other counties	2,020,840	272,636	317,069	2,610,545	2.08	267	201	53,653	48.66
Total North Dakota	2,030,820	383,883	317,232	2,731,935	2.14	307	194	59,652	45.80

OHIO

Athens	60,283	81,639	160	142,082	3.43	109	183	19,895	7.14
Belmont	7,519,181	177,278	972	7,697,431	4.06	1,752	222	389,037	19.79
Carroll	106,245	160,221	1,710	268,176	3.45	57	271	15,433	17.38
Columbiana	242,253	1,185,675	---	1,427,928	3.13	322	260	83,702	17.06
Coshocton	585,070	773,549	1,247,651	2,606,270	4.14	295	261	77,108	33.80
Gallia	420,180	73,897	224	494,301	2.86	150	169	25,283	19.55
Guernsey	303,001	61,467	---	364,468	3.14	153	145	22,227	16.40
Harrison	7,935,182	644,311	5,774	8,585,267	4.01	1,865	241	449,415	19.10
Hocking	2,943	99,680	100	102,723	3.30	37	179	6,617	15.52
Holmes	147,040	41,378	---	188,418	3.35	30	302	9,071	20.77
Jackson	549	608,572	150	609,271	3.80	115	249	28,641	21.27
Jefferson	2,907,044	2,056,919	6,458	4,970,421	3.58	750	243	182,122	27.29
Lawrence	W	W	W	W	W	W	W	W	W
Mahoning	---	687,374	1,440	688,814	3.75	131	283	37,070	18.58
Meigs	26,046	230,724	---	256,770	3.45	159	96	15,263	16.82
Morgan	---	15,832	1,784,482	1,800,314	3.25	216	253	54,566	32.99
Muskingum	32,714	99,267	---	131,981	4.36	97	162	15,680	8.42
Noble	1,075,583	1,909,131	69	2,984,783	2.86	251	242	60,858	49.05
Perry	W	W	W	W	W	W	W	W	W
Portage	---	6,472	---	6,472	4.19	26	50	1,289	5.02

See footnotes at end of table.

Table 54.—Production, value, men working daily, days active, man-days and output per man per day at bituminous coal and lignite mines in the United States, 1965, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
OHIO									
Stark	---	432,584	2,661	435,245	$3.22	86	218	18,742	23.22
Tuscarawas	564,490	2,365,181	5,768	2,935,439	3.47	594	265	157,429	18.65
Vinton	13,126	127,827	---	140,953	3.96	54	245	13,256	10.63
Washington	---	116,695	---	116,695	3.45	20	187	3,730	31.29
Wayne	---	45,251	---	45,251	3.01	10	272	2,659	17.02
Other counties	1,539,439	834,809	16,000	2,390,248	3.74	284	248	70,327	33.99
Total Ohio	23,480,369	12,835,733	3,073,619	39,389,721	3.71	7,563	233	1,759,420	22.39
OKLAHOMA									
Craig	275,599	9,863	---	285,462	3.44	71	245	17,385	16.42
Haskell	W	W	W	W	W	W	W	W	W
Le Flore	6,657	2,175	---	8,832	7.50	19	103	1,945	4.54
Muskogee	---	1,000	---	1,000	5.65	15	35	529	1.89
Okmulgee	---	1,711	---	1,711	4.90	2	57	114	15.00
Rogers	W	W	W	W	W	W	W	W	W
Other counties	676,023	984	---	677,007	6.58	138	203	28,080	24.11
Total Oklahoma	958,279	15,733	---	974,012	5.67	245	196	48,053	20.27
PENNSYLVANIA									
Allegheny	3,396,824	1,421,476	160,393	4,978,693	5.40	1,320	227	299,319	16.63
Armstrong	2,504,923	1,970,864	317,014	4,792,801	4.03	1,100	220	242,031	19.80
Beaver	7,445	416,605	12	424,062	3.90	218	229	50,012	8.48
Bedford	---	317,141	---	317,141	3.29	109	227	24,710	12.83
Blair	---	5,484	---	5,484	5.77	11	152	1,667	3.29
Bradford	W	W	W	W	W	W	W	W	W
Butler	1,249,969	983,848	130	2,233,947	3.69	476	236	112,144	19.92
Cambria	8,012,707	909,704	4,969	8,927,380	5.71	3,600	234	843,453	10.58
Cameron	W	W	W	W	W	W	W	W	W
Centre	334,260	287,683	---	621,943	3.40	497	179	89,082	6.98
Clarion	2,117,845	1,125,128	1,450	3,244,423	3.52	561	247	138,808	23.37
Clearfield	5,462,222	1,564,754	3,777	7,030,753	3.73	1,849	247	455,864	15.42
Clinton	420,396	134,300	---	554,696	3.58	79	276	21,771	25.48
Elk	160,840	354,339	380	515,559	3.62	111	241	26,766	19.26

Fayette	899,903	308,407	303	1,208,613	5.26	558	243	135,485	8.92
Greene	12,147,432	184,366	11,150	12,342,948	6.19	3,631	235	853,961	14.45
Huntingdon	---	65,910	---	65,910	3.56	33	163	5,371	12.27
Indiana	5,528,218	462,718	643,818	6,634,754	4.30	1,993	214	427,411	15.52
Jefferson	1,581,444	257,618	277	1,839,339	3.72	519	212	109,909	16.74
Lawrence	---	905,116	831	905,947	2.92	169	256	43,234	20.95
Lycoming	W	W	W	W	W	W	W	W	W
McKean	---	15,556	426	15,982	3.70	54	91	4,873	3.28
Mercer	346,595	206,464	365	553,424	4.06	133	285	38,010	14.56
Somerset	3,005,985	740,039	548	3,746,572	4.44	1,386	180	249,282	15.03
Tioga	W	W	W	W	W	W	W	W	W
Venango	82,701	315,991	18	398,710	3.32	84	261	21,953	18.16
Washington	12,333,223	1,897,532	9,242	14,239,997	6.34	3,993	244	974,232	14.62
Westmoreland	3,185,756	520,034	440,732	4,146,522	5.20	1,258	209	263,233	15.75
Other counties	4,139	558,710	---	562,849	4.14	108	248	26,749	21.04
Total Pennsylvania	62,782,827	15,929,787	1,595,835	80,308,449	5.07	23,850	229	5,459,330	14.71
SOUTH DAKOTA (LIGNITE)									
Dewey	---	10,000	---	10,000	4.87	4	125	500	20.00
TENNESSEE									
Anderson	1,184,694	847,354	19	2,032,067	3.61	515	206	106,191	19.14
Bledsoe	3,569	8,000	---	11,569	4.33	12	200	2,314	5.00
Campbell	736,910	338,309	---	1,075,219	2.98	508	147	74,630	14.41
Claiborne	246,697	15,234	---	261,931	3.69	164	154	25,315	10.35
Cumberland	---	4,000	---	4,000	3.50	14	108	1,544	2.59
Fentress	18,572	39,988	---	58,560	4.08	46	214	9,859	5.94
Grundy	119,627	84,331	---	203,958	4.06	45	256	11,535	17.68
Hamilton	---	42,258	---	42,258	4.13	117	101	11,872	3.56
Marion	558,804	75,761	---	634,565	4.67	265	190	50,435	12.58
Morgan	57,230	326,460	---	383,690	3.19	196	228	44,735	8.58
Overton	19,010	6,749	---	25,759	3.88	16	209	3,444	7.48
Pickett	---	3,024	---	3,024	3.88	8	75	605	5.00
Putnam	197,025	22,587	---	219,612	3.66	98	150	14,641	15.00
Rhea	---	24,000	---	24,000	4.44	48	100	4,800	5.00
Scott	315,703	205,595	---	521,298	3.06	184	165	30,351	17.18
Sequatchie	53,830	60,061	---	113,891	3.79	104	116	12,075	9.43
Van Buren	170,688	79,084	---	249,772	3.50	57	180	10,256	24.35
Total Tennessee	3,682,359	2,182,795	19	5,865,173	3.57	2,397	173	414,602	14.15
UTAH									
Carbon	3,615,008	135,305	28,728	3,779,041	6.86	1,122	210	235,601	16.04
Emery	914,868	183,354	2,492	1,100,714	4.83	338	223	75,391	14.60
Iron	---	36,101	---	36,101	4.47	20	154	3,036	11.89
Kane	W	W	W	W	W	W	W	W	W

See footnotes at end of table.

Table 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1965, by States and counties—Continued

County	Production (net tons)				Average value per ton[3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day[4]
	Shipped by rail or water[1]	Shipped by truck	Used at mine[2]	Total					
UTAH									
Sevier	W	W	W	W	W	W	W	W	W
Summit	---	12,873	45	12,918	$4.72	6	213	1,219	10.60
Other counties	---	63,206	23	63,229	5.58	9	204	1,839	34.38
Total Utah	4,529,876	430,839	31,288	4,992,003	6.37	1,495	212	317,086	15.74
VIRGINIA									
Buchanan	12,770,324	2,520,751	---	15,291,075	3.92	6,870	202	1,388,932	11.01
Dickenson	7,945,677	889,167	200	8,835,044	4.26	1,842	227	418,705	21.10
Lee	377,806	121,482	---	499,288	4.32	438	180	78,653	6.35
Montgomery	W	W	W	W	W	W	W	W	W
Russell	1,564,661	171,811	---	1,736,472	5.21	585	217	126,922	13.68
Scott	W	W	W	W	W	W	W	W	W
Tazewell	354,335	46,459	---	400,794	3.09	198	201	39,880	10.05
Wise	6,414,065	650,333	216,030	7,280,428	4.01	1,658	223	369,395	19.71
Other counties	4,000	5,814	---	9,814	4.91	32	103	3,287	2.99
Total Virginia	29,430,868	4,405,817	216,230	34,052,915	4.09	11,623	209	2,425,774	14.04
WASHINGTON									
King	W	W	W	W	W	W	W	W	W
Lewis	W	W	W	W	W	W	W	W	W
Thurston	---	9,601	---	9,601	9.49	7	97	638	15.04
Other counties	16,657	28,500	---	45,157	8.99	49	148	7,261	6.22
Total Washington	16,657	38,101	---	54,758	9.07	56	141	7,899	6.93
WEST VIRGINIA									
Barbour	3,344,489	21,733	256	3,366,478	4.26	795	227	180,084	18.69
Boone	8,397,291	193,033	6,859	8,597,183	4.46	2,123	196	415,115	20.71
Braxton	W	W	W	W	W	W	W	W	W
Brooke	126,213	350,927	543,200	1,020,340	3.29	265	230	60,854	16.77
Clay	55,677	9,118	---	64,795	3.98	50	168	8,403	7.71
Fayette	5,851,015	375,755	10,352	6,237,122	4.45	2,371	216	511,066	12.20
Gilmer	W	W	W	W	W	W	W	W	W
Grant	W	W	W	W	W	W	W	W	W
Greenbrier	890,949	80,857	221	972,027	4.81	446	217	96,688	10.05
Hancock	---	3,658	---	3,658	2.45	5	50	244	15.00

Harrison	8,048,663	108,277	621	8,157,561	4.17	1,707	227	387,838	21.03
Kanawha	10,786,651	148,583	3,038	10,938,272	4.21	2,629	213	559,220	19.56
Lewis	316,372	15,420	10,623	342,415	3.49	253	98	24,869	13.77
Lincoln	17,890	---	---	17,890	2.42	12	100	1,193	15.00
Logan	16,315,000	21,733	6,650	16,343,383	4.55	4,745	229	1,086,387	15.04
Marion	13,996,034	92,604	4,250	14,092,888	5.11	2,876	265	762,187	18.49
Marshall	W	W	W	W	W	W	W	W	W
Mason	251,939	171,459	---	423,398	3.42	176	210	37,000	11.44
McDowell	16,786,571	213,161	101,793	17,101,525	6.30	4,964	237	1,175,927	14.54
Mercer	1,288,406	34,383	2,482	1,325,271	6.13	389	222	86,246	15.37
Mineral	W	W	W	W	W	W	W	W	W
Mingo	5,388,143	250,823	632	5,639,598	5.20	1,546	213	329,908	17.09
Monongalia	8,712,558	264,914	---	8,977,472	4.76	1,726	265	457,936	19.60
Nicholas	7,991,558	37,890	1,980	8,031,428	4.74	2,458	237	583,619	13.76
Ohio	W	W	W	W	W	W	W	W	W
Pocahontas	83,006	8,283	---	91,289	3.52	22	162	3,555	25.68
Preston	3,472,595	379,521	5,079	3,857,195	3.62	1,259	213	268,029	14.39
Raleigh	9,438,471	193,940	24,724	9,657,135	5.38	3,199	237	758,636	12.73
Randolph	989,440	37,750	31	1,027,221	3.61	491	190	93,471	10.99
Taylor	313,765	2,818	---	316,583	3.52	156	158	24,624	12.86
Tucker	459,884	---	---	459,884	2.86	73	203	14,810	31.05
Upshur	580,125	10,523	---	590,648	3.81	210	175	36,707	16.09
Wayne	W	W	W	W	W	W	W	W	W
Webster	653,366	12,688	750	666,804	4.64	413	144	59,643	11.18
Wyoming	13,966,145	106,903	25,697	14,098,745	5.39	3,953	246	973,773	14.48
Other counties	4,464,404	498,188	1,810,408	6,773,000	4.20	1,696	227	384,338	17.62
Total West Virginia	142,986,620	3,644,942	2,559,646	149,191,208	4.87	41,008	229	9,382,370	15.90
WYOMING									
Campbell	387,146	18,923	84,458	490,527	1.36	32	261	8,327	58.91
Carbon	W	W	W	W	W	W	W	W	W
Converse	W	W	W	W	W	W	W	W	W
Hot Springs	5,109	6,602	---	11,711	7.11	18	134	2,405	4.87
Lincoln	W	W	W	W	W	W	W	W	W
Sheridan	329,908	19,430	---	349,338	3.32	38	250	9,514	36.72
Sweetwater	W	W	W	W	W	W	W	W	W
Other counties	684,597	1,255,798	467,822	2,408,217	3.42	229	230	52,701	45.70
Total Wyoming	1,406,760	1,300,753	552,280	3,259,793	3.11	317	230	72,947	44.69
UNITED STATES									
Total United States	431,833,321	68,301,813	11,953,129	512,088,263	4.44	133,732	219	29,231,733	17.52

W Withheld to avoid disclosing individual company data; included with "other counties."

[1] Includes coal loaded at mine directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for all other purposes at mine, and transported from mine to point of use by conveyor, tram, or pipeline.

[3] Value received or charged for coal f.o.b. mine. Includes a value for coal not sold but used by producers, such as mine fuel and coal coked, as estimated by producers at average prices that might have been received if such coal had been sold commercially.

[4] In certain counties the average tons per man per day is large because of auger mining, strip mining, or mechanical loading underground.

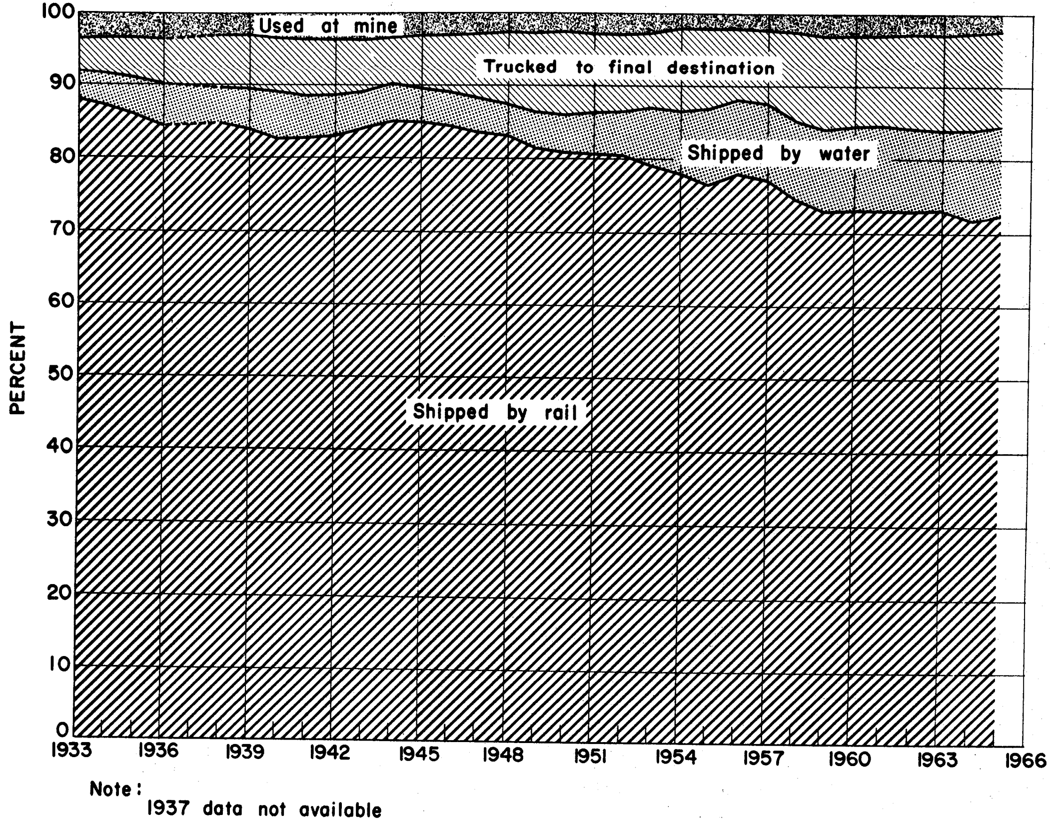

Figure 12.—Percentage of total production of bituminous coal and lignite, 1933–65, by method of shipment from mines, and percentage used at mines.

Table 55.—Bituminous coal and lignite shipped from mines, by method of shipment, and that used at mines in the United States

Year	Method of shipment from mines: Shipped by rail and trucked to rail	Shipped by water and trucked to water	Trucked to final destination	Used at mine [1]	Total production
	THOUSAND NET TONS				
1933	293,258	13,021	15,463	11,888	333,630
1934	313,304	15,128	18,739	12,197	359,368
1935	319,742	18,327	21,960	12,344	372,373
1936	370,763	24,868	27,929	15,528	439,088
1937	NA	NA	NA	NA	445,531
1938	295,336	16,903	25,592	10,714	348,545
1939	331,190	22,229	29,534	11,902	394,855
1940	380,388	29,493	35,540	15,350	460,771
1941	425,184	30,240	40,056	18,669	514,149
1942	482,814	34,018	45,154	20,707	582,693
1943	495,863	30,188	42,433	21,693	590,177
1944	527,136	31,518	40,123	20,799	619,576
1945	490,472	27,548	41,477	18,120	577,617
1946	450,615	24,642	42,731	15,934	533,922
1947	527,282	29,803	55,859	17,680	630,624
1948	498,194	26,735	58,260	16,329	599,518
1949	356,602	21,829	47,786	11,651	437,868
1950	417,225	27,583	58,286	13,217	516,311
1951	430,387	29,984	58,132	15,162	533,665
1952	375,911	27,746	50,231	12,953	466,841
1953	362,133	35,648	47,102	12,407	457,290
1954	305,918	32,912	44,689	8,187	391,706
1955	355,924	47,476	51,607	9,626	464,633
1956	390,015	50,732	49,768	10,359	500,874
1957	380,471	51,171	50,334	10,728	492,704
1958	305,642	43,899	50,605	10,300	410,446
1959	300,763	45,954	52,564	12,747	412,028
1960	303,865	46,784	52,699	12,164	415,512
1961	293,546	46,348	51,044	12,039	402,977
1962	307,328	48,106	54,853	11,862	422,149
1963	333,989	50,664	60,901	13,374	458,928
1964	349,377	59,349	65,532	12,740	486,998
1965	371,544	60,289	68,302	11,953	512,088
	PERCENTAGE OF TOTAL				
1933	87.9	3.9	4.6	3.6	100.0
1934	87.2	4.2	5.2	3.4	100.0
1935	85.9	4.9	5.9	3.3	100.0
1936	84.4	5.7	6.4	3.5	100.0
1937	NA	NA	NA	NA	100.0
1938	84.7	4.9	7.3	3.1	100.0
1939	83.9	5.6	7.5	3.0	100.0
1940	82.6	6.4	7.7	3.3	100.0
1941	82.7	5.9	7.8	3.6	100.0
1942	82.9	5.8	7.7	3.6	100.0
1943	84.0	5.1	7.2	3.7	100.0
1944	85.1	5.1	6.5	3.3	100.0
1945	84.9	4.8	7.2	3.1	100.0
1946	84.4	4.6	8.0	3.0	100.0
1947	83.6	4.7	8.9	2.8	100.0
1948	83.1	4.5	9.7	2.7	100.0
1949	81.4	5.0	10.9	2.7	100.0
1950	80.8	5.3	11.3	2.6	100.0
1951	80.7	5.6	10.9	2.8	100.0
1952	80.5	5.9	10.8	2.8	100.0
1953	79.2	7.8	10.3	2.7	100.0
1954	78.1	8.4	11.4	2.1	100.0
1955	76.6	10.2	11.1	2.1	100.0

See footnotes at end of table.

Table 55.—Bituminous coal and lignite shipped from mines, by method of shipment, and that used at mines in the United States

Year	Method of shipment from mines			Used at mine [1]	Total production
	Shipped by rail and trucked to rail	Shipped by water and trucked to water	Trucked to final destination		
PERCENTAGE OF TOTAL—Continued					
1956	77.9	10.1	9.9	2.1	100.0
1957	77.2	10.4	10.2	2.2	100.0
1958	74.5	10.7	12.3	2.5	100.0
1959	73.0	11.1	12.8	3.1	100.0
1960	73.1	11.3	12.7	2.9	100.0
1961	72.9	11.5	12.6	3.0	100.0
1962	72.8	11.4	13.0	2.8	100.0
1963	72.8	11.0	13.3	2.9	100.0
1964	71.7	12.2	13.5	2.6	100.0
1965	72.6	11.8	13.3	2.3	100.0

NA Not available.

[1] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for all other purposes at mine, and transported from mine to point of use by conveyor, tram, or pipeline.

Table 56.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1965, as reported by mine operators

Route	State	By State (net tons)	Total for route (net tons)
RAILROAD			
Alaska	Alaska	877,660	877,660
Atchison, Topeka & Santa Fe	Illinois	144,821	937,923
	New Mexico	793,102	
Baltimore & Ohio	Illinois	465,652	40,037,842
	Ohio	5,758,360	
	Pennsylvania	3,630,984	
	West Virginia	30,182,846	
Bessemer & Lake Erie	Pennsylvania	1,944,482	1,944,482
Cambria & Indiana	do	4,150,013	4,150,013
Carbon County	Utah	1,239,812	1,239,812
Chesapeake & Ohio	Kentucky	11,795,702	49,679,605
	Ohio	16,069	
	Virginia	40,270	
	West Virginia	37,827,564	
Cheswick & Harmar	Pennsylvania	369,354	369,354
Chicago & Burlington & Quincy	Illinois	8,410,276	10,077,230
	Iowa	310,173	
	Missouri	634,618	
	Wyoming	722,163	
Chicago & Eastern Illinois	Illinois	1,993,687	2,464,788
	Indiana	471,101	
Chicago & Illinois Midland	Illinois	5,175,605	5,175,605
Chicago, Milwaukee, St. Paul & Pacific	Indiana	2,064,235	2,117,940
	North Dakota (lignite)	53,705	
Chicago & North Western	Illinois	2,408,071	2,408,071
Chicago, Rock Island & Pacific	do	1,267,154	1,590,539
	Iowa	311,385	
	Missouri	12,000	
Clinchfield	Kentucky	300,452	4,475,260
	Virginia	4,174,808	
Colorado & Wyoming	Colorado	853,220	853,220
Denver & Rio Grande Western	do	2,329,873	4,845,487
	Utah	2,515,614	
Erie-Lackawanna	Ohio	232,302	236,441
	Pennsylvania	4,139	
Great Northern	North Dakota (lignite)	306,174	306,174
Gulf, Mobile & Ohio	Illinois	5,047,842	5,047,842
Illinois Central	do	12,772,047	24,180,502
	Indiana	8,700	
	Kentucky	11,399,755	

Table 56.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1965, as reported by mine operators—Continued

Route	State	By State (net tons)	Total for route (net tons)
RAILROAD—continued			
Illinois Terminal	Illinois	253,855	253,855
Interstate	Virginia	4,600,448	4,600,448
Kansas City Southern	Oklahoma	145,277	145,277
Kentucky & Tennessee	Kentucky	123,266	123,266
Lake Erie, Franklin & Clarion	Pennsylvania	406,569	406,569
Louisville & Nashville	Alabama	1,559,077	29,530,704
	Kentucky	27,209,597	
	Tennessee	697,241	
	Virginia	64,789	
Mary Lee	Alabama	808,111	808,111
Midland Valley	Oklahoma	296,281	296,281
Missouri-Illinois	Illinois	734,401	734,401
Missouri-Kansas-Texas	Kansas	446,828	915,879
	Missouri	438,051	
	Oklahoma	31,000	
Missouri Pacific	Arkansas	216,013	4,428,569
	Illinois	4,028,311	
	Missouri	55,123	
	Oklahoma	129,122	
Monon	Indiana	75,000	75,000
Monongahela	Pennsylvania	532,040	8,734,394
	West Virginia	8,202,354	
Montour	Pennsylvania	1,936,251	1,936,251
New York Central (includes coal shipped over Kanawha & Michigan, Kelley's Creek, Toledo & Ohio Central, and Zanesville & Western)	Illinois	5,397,904	25,317,343
	Indiana	6,287,788	
	Ohio	3,487,542	
	Pennsylvania	5,418,288	
	West Virginia	4,725,821	
Norfolk & Western	Iowa	115,758	76,988,866
	Kentucky	6,398,512	
	Missouri	656,061	
	Ohio	6,717,240	
	Virginia	20,110,709	
	West Virginia	42,990,586	
Northern Pacific	Montana (bituminous and lignite)	314,951	1,610,473
	North Dakota (lignite)	1,295,522	
Pacific Coast	Washington	16,657	16,657
Pennsylvania	Indiana	1,249,507	27,002,290
	Ohio	4,106,749	
	Pennsylvania	21,640,179	
	West Virginia	5,855	
Pittsburg & Shawmut	Pennsylvania	1,991,545	1,991,545
Pittsburgh & Lake Erie	do	1,174,408	1,174,408
St. Louis-San Francisco	Alabama	392,636	1,195,553
	Arkansas	9,734	
	Kansas	436,584	
	Oklahoma	356,599	
Soo Line	North Dakota (lignite)	375,419	375,419
Southern	Alabama	3,307,314	5,710,501
	Indiana	11,010	
	Kentucky	571,665	
	Tennessee	1,380,668	
	Virginia	439,844	
Southern Iowa	Iowa	2,337	2,337
Tennessee	Tennessee	845,686	845,686
Tennessee Central	do	234,607	234,607
Tennessee Coal, Iron and Railroad Co	Alabama	2,348,475	2,348,475
Toledo, Peoria & Western	Illinois	614,765	614,765
Union Pacific	Colorado	463,602	1,148,199
	Wyoming	684,597	
Utah	Utah	774,450	774,450
Western Allegheny	Pennsylvania	62,858	62,858
Western Maryland	Maryland	735,897	7,395,543
	Pennsylvania	611,914	
	West Virginia	6,047,732	
Woodward Iron Company	Alabama	715,140	715,140
Youngstown & Southern	Ohio	6,322	13,767
	Pennsylvania	7,445	
Total railroad shipments		371,543,677	371,543,677

Table 56.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1965, as reported by mine operators—Continued

Route	State	By State (net tons)	Total for route (net tons)
WATERWAY			
Allegheny River	Pennsylvania	1,618,136	1,618,136
Black Warrior River	Alabama	2,445,013	2,445,013
Cumberland River	Kentucky	39,689	39,689
Green River	do	10,970,785	10,970,785
Guyandot River	West Virginia	7,500	7,500
Illinois River	Illinois	3,048,793	3,048,793
Kanawha River	West Virginia	5,485,220	5,485,220
Kentucky River	Kentucky	1,955	1,955
Monongahela River	Pennsylvania	17,284,222	23,884,015
	West Virginia	6,599,793	
Ohio River	Illinois	811,037	12,005,429
	Indiana	2,292,312	
	Kentucky	4,834,946	
	Ohio	3,155,785	
	West Virginia	911,349	
Tennessee River	Alabama	258,952	783,109
	Tennessee	524,157	
Total waterway shipments		60,289,644	60,289,644
Total loaded at mines for shipment by railroads and waterways		431,833,321	431,833,321
Shipped by truck from mine to final destination		68,301,813	68,301,813
Used at mine [1]		11,953,129	11,953,129
Total production, 1965		512,088,263	512,088,263

[1] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for all other purposes at mine, and transported from mine to point of use by conveyor, tram, or pipeline.

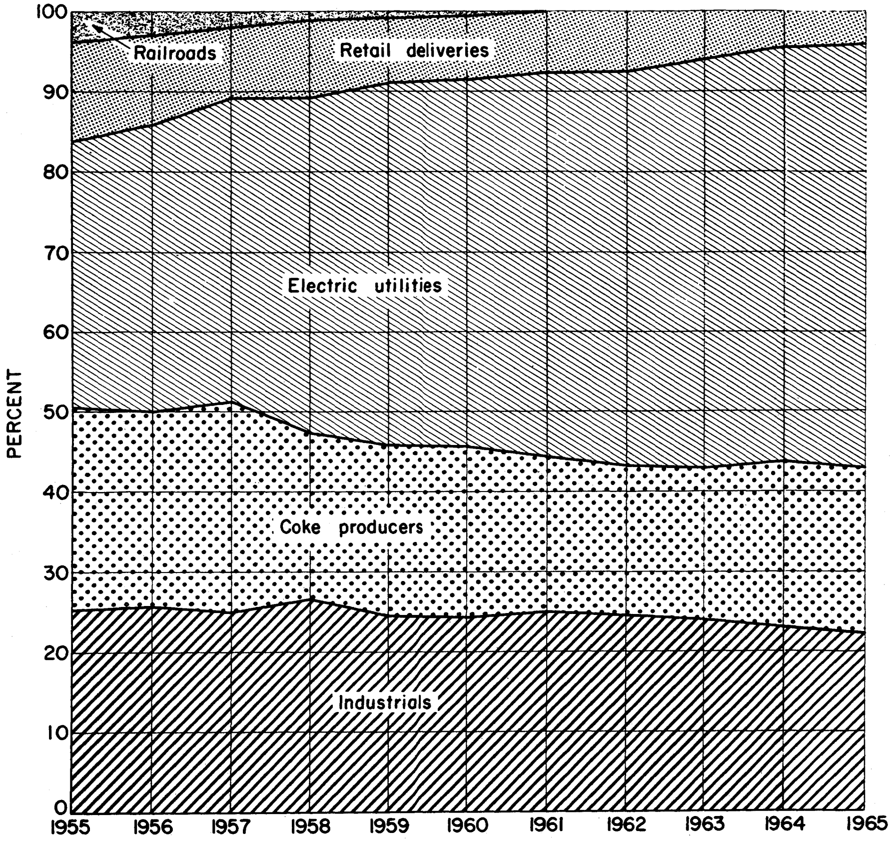

Figure 13.—Percentage of total consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States, 1955–65

Table 57.—Consumption of bituminous coal and lignite, by consumer class, with retail deliveries in the United States

(Thousand net tons)

Year and month	Electric power utilities [1]	Bunker, lake vessel and foreign [2]	Railroads (class I) [3]	Manufacturing and mining industries: Beehive coke plants	Oven coke plants	Steel and rolling mills [4]	Cement mills	Other manufacturing and mining industries [5]	Retail deliveries to other consumers [6]	Total of classes shown [7]
1933	27,088	2,298	72,548	1,408	38,681	14,129	2,760	81,377	77,396	317,685
1934	29,707	2,423	76,037	1,635	44,343	15,391	3,457	87,314	83,507	343,814
1935	30,936	2,683	77,109	1,469	49,046	16,585	3,456	94,598	80,444	356,326
1936	38,104	3,052	86,391	2,698	63,244	19,019	4,711	111,030	80,044	408,293
1937	41,045	3,433	88,080	4,927	69,575	18,148	5,182	124,056	76,331	430,777
1938	36,440	2,310	73,921	1,360	45,266	11,877	4,413	94,196	66,498	336,281
1939	42,304	2,764	79,072	2,298	61,216	13,843	5,194	100,637	68,770	376,098
1940	49,126	2,989	85,130	4,803	76,583	14,169	5,559	107,864	84,687	430,910
1941	59,888	3,304	97,384	10,529	82,609	15,384	6,735	121,880	94,402	492,115
1942	63,472	3,226	115,410	12,876	87,974	14,722	7,462	132,767	102,141	540,050
1943	74,036	3,042	130,283	12,441	90,019	15,864	5,842	142,149	120,121	593,797
1944	76,656	3,069	132,049	10,858	94,438	15,152	3,767	131,498	122,112	589,599
1945	71,603	3,192	125,120	8,135	87,214	14,241	4,203	126,562	119,297	559,567
1946	68,743	2,632	110,166	7,167	76,121	12,151	6,990	117,732	98,684	500,386
1947	86,009	3,087	109,296	10,475	94,325	14,195	7,919	123,928	96,657	545,891
1948	95,620	2,552	94,838	10,322	96,984	14,193	8,546	110,060	86,794	519,909
1949	80,610	2,056	68,123	5,354	85,882	10,529	7,966	96,629	88,389	445,538
1950	88,262	2,042	60,969	9,088	94,757	10,877	7,923	95,862	84,422	454,202
1951	101,898	2,220	54,005	11,418	102,030	11,260	8,507	103,188	74,378	468,904
1952	103,309	1,839	37,962	6,912	90,702	9,632	7,903	93,637	66,861	418,757
1953	112,283	1,839	27,735	8,226	104,648	8,764	8,167	95,160	59,976	426,798
1954	115,235	1,244	17,370	980	84,411	6,983	7,924	77,115	51,798	363,060
1955	140,550	1,499	15,473	2,869	104,508	7,353	8,529	89,611	53,020	423,412
1956	154,983	1,470	12,308	4,043	101,870	7,189	9,026	93,302	48,667	432,858
1957	157,398	1,364	8,401	3,473	104,547	6,938	8,633	87,202	35,712	413,668
1958	152,928	955	3,725	1,017	75,563	7,268	8,256	81,372	35,619	366,703
1959	165,788	969	2,600	1,827	77,354	6,674	8,510	73,396	29,138	366,256
1960	173,882	945	2,101	1,640	79,375	7,378	8,216	76,487	30,405	380,429
1961	179,629	770	(8)	1,496	72,385	7,495	7,615	77,280	27,735	374,405
1962	190,833	687	(8)	1,339	72,923	7,319	7,719	78,766	28,188	387,774
1963	209,038	670	(8)	1,613	76,020	7,401	8,138	82,797	23,548	409,225
1964:										
January	20,389	1	(8)	140	6,657	817	617	8,188	2,968	39,777
February	18,732	1	(8)	135	6,412	776	619	7,590	2,496	36,761
March	18,465	5	(8)	154	6,868	764	683	7,636	1,872	36,447
April	16,666	56	(8)	151	6,901	654	686	6,918	1,030	33,062
May	16,757	103	(8)	155	7,389	542	726	6,517	518	32,707
June	17,997	91	(8)	133	7,221	488	721	6,009	562	33,222
July	18,794	79	(8)	114	7,337	474	758	5,558	655	33,769
August	18,685	88	(8)	156	7,308	462	775	6,080	1,066	34,620
September	18,013	92	(8)	182	7,311	479	732	6,171	1,501	34,481
October	18,682	94	(8)	210	7,777	567	766	7,152	2,190	37,438

November	18,678	80	(8)	233	7,646	623	782	7,080	1,851	36,973
December	21,174	21	(8)	262	7,905	748	814	8,029	2,906	41,859
Total	223,032	711	(8)	2,025	86,732	7,394	8,679	82,928	19,615	431,116
1965:										
January	21,471	1	(8)	285	7,962	794	661	8,045	2,825	42,044
February	19,608	---	(8)	261	7,306	759	627	7,442	2,743	38,746
March	21,134	3	(8)	312	8,148	786	738	7,918	2,370	41,409
April	18,323	45	(8)	263	7,894	628	715	6,992	1,019	35,879
May	18,632	82	(8)	238	8,206	534	700	6,510	528	35,430
June	19,292	88	(8)	283	7,853	493	725	6,425	442	35,601
July	20,018	72	(8)	255	7,913	508	730	6,078	564	36,138
August	21,051	92	(8)	266	7,868	518	723	6,200	840	37,558
September	19,936	85	(8)	150	7,363	536	766	6,113	1,266	36,215
October	20,066	85	(8)	128	7,337	585	873	7,323	1,748	38,145
November	20,552	78	(8)	117	6,966	604	814	7,931	2,078	39,140
December	22,646	24	(8)	135	7,270	721	801	8,637	2,625	42,859
Total	242,729	655	(8)	2,693	92,086	7,466	8,873	85,614	19,048	459,164

[1] Federal Power Commission.
[2] Bureau of the Census, U.S. Department of Commerce, Ore and Coal Exchange.
[3] Association of American Railroads. Represents consumption of bituminous coal and lignite for all uses, including locomotive, powerhouse, shop, and station fuel.
[4] Estimates based upon reports collected from a selected list of representative steel and rolling mills.
[5] Estimates based upon reports collected from a selected list of representative manufacturing plants.
[6] Estimates based upon reports collected from a selected list of representative retailers. Includes some coal shipped by truck from mine to final destination.
[7] The total of classes shown approximates total consumption. The calculation of consumption from production, imports, exports, and changes in stocks is not as accurate as the "Total of classes shown" because certain significant items of stocks are not included in year-end stocks. These items are: Stocks on Lake and Tidewater docks, stocks at other intermediate storage piles between mine and consumer, and coal in transit.
[8] Canvass discontinued.

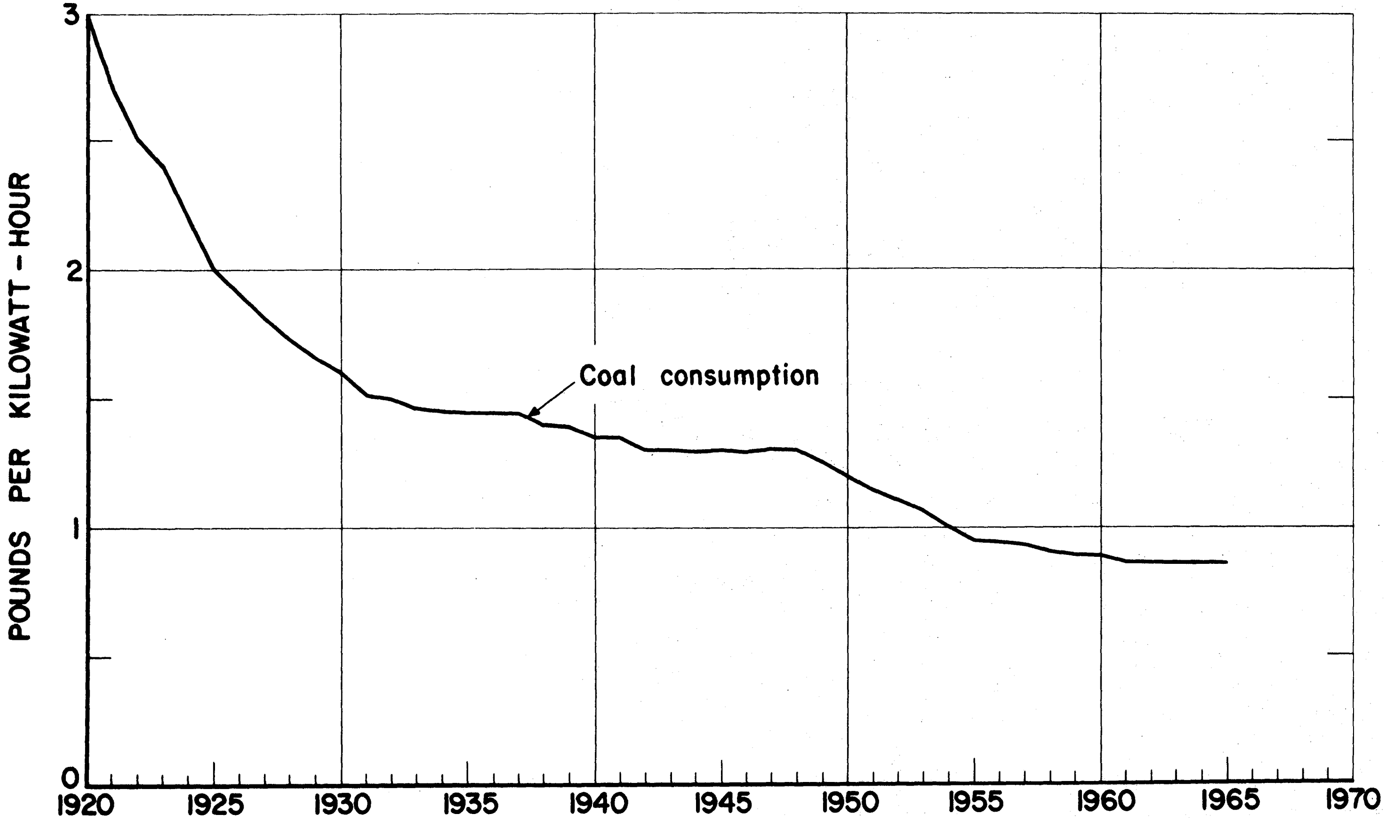

Figure 14.—Trend in fuel economy at electric-utility powerplants in the United States, 1920–65.

Table 58.—Fuel economy in consumption of coal at electric-utility powerplants in the United States

Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100	Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100	Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100
1919	3.20	100.0	1935	1.44	45.0	1951	1.14	35.6
1920	3.00	93.8	1936	1.44	45.0	1952	1.10	34.4
1921	2.70	84.4	1937	1.44	45.0	1953	1.06	33.1
1922	2.50	78.1	1938	1.40	43.8	1954	.99	30.9
1923	2.40	75.0	1939	1.38	43.1	1955	.95	29.7
1924	2.20	68.8	1940	1.34	41.9	1956	.94	29.4
1925	2.00	62.5	1941	1.34	41.9	1957	.93	29.1
1926	1.90	59.4	1942	1.30	40.6	1958	.90	28.1
1927	1.82	56.9	1943	1.30	40.6	1959	.89	27.8
1928	1.73	54.1	1944	1.29	40.3	1960	.88	27.5
1929	1.66	51.9	1945	1.30	40.6	1961	.86	26.9
1930	1.60	50.0	1946	1.29	40.3	1962	.86	26.9
1931	1.52	47.5	1947	1.31	40.9	1963	.86	26.9
1932	1.49	46.6	1948	1.30	40.6	1964	.86	26.9
1933	1.46	45.6	1949	1.24	38.8	1965	.86	26.9
1934	1.45	45.3	1950	1.19	37.2			

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Table 59.—Distribution of bituminous coal and lignite, 1965, by method of movement and consumer use

(Thousand net tons)

Shipments	Electric utilities	Coke and gas plants	Retail dealers	All others	Railroad fuel	Used at mines and sales to employees
Total shipments to all destinations in the United States, Canada, and Mexico, by all methods of movements and consumer use, and overseas exports	249,272	100,532	22,827	100,876	1,317	1,969
Shipments to all destinations in the United States, Canada, and Mexico by specific method of movement and consumer use:						
Method movement:						
All-rail	123,788	49,990	14,058	63,981	---	---
River and ex-river	52,424	29,176	921	6,497	---	---
Great Lakes [1]	21,921	13,692	3,981	13,386	---	---
Tidewater [2]	16,751	6,161	64	882	---	---
Truck	22,112	1,345	3,803	16,008	---	---
Tramway, conveyor, and private railroad	12,276	168	---	122	---	---
Method of movement and/or consumer uses unknown	---	---	---	---	1,317	1,969
Total	249,272	100,532	22,827	100,876	1,317	1,969

Shipments	Canadian Great Lakes commercial docks [3]	U.S. Great Lakes dock storage [3]	U.S. tidewater dock storage [3]	Overseas exports [4]	Net change in mine inventory	Total
Total shipments to all destinations in the United States, Canada, and Mexico, by all methods of movements and consumer use, and overseas exports	1,076	−252	10	34,746	152	512,525
Shipments to all destinations in the United States, Canada, and Mexico by specific method of movement and consumer use:						
Method of movement:						
All-rail	---	---	---	---	---	251,817
River and ex-river	---	---	---	---	---	89,018
Great Lakes [1]	---	---	---	---	---	52,980
Tidewater [2]	---	---	---	---	---	23,858
Truck	---	---	---	---	---	43,268
Tramway, conveyor, and private railroad	---	---	---	---	---	12,566
Method of movement and/or consumer uses unknown	1,076	−252	10	34,746	152	39,018
Total	1,076	−252	10	34,746	152	512,525

[1] Excludes shipments to Canadian Great Lakes commercial docks and U.S. dock storage for which consumer uses are not available; however, includes vessel fuel, the destinations of which are not available.

[2] Excludes overseas exports and U.S. tidewater dock storage for which consumer uses are not available; however, includes bunker fuel, the destinations of which are not available.

[3] Consumer use unknown.

[4] Excludes Canada; consumer use unknown.

Table 60.—Distribution of bituminous coal and lignite, 1965, by district of origin and consumer use

(Thousand net tons)

District of origin [1]	Electric utilities	Coke and gas plants	Retail dealers	All others	Railroad fuel	Used at mines and sales to employees
1	25,251	3,940	658	7,701	174	648
2	9,221	25,233	631	7,581	11	41
3 and 6	33,125	9,266	870	8,144	77	15
4	25,804	1	2,017	11,806	237	28
7	1,552	16,710	1,849	3,353	112	539
8	47,803	31,551	9,291	31,008	215	550
9	34,161	99	2,009	4,795	57	---
10	38,126	1,565	2,619	16,077	221	55
11	9,345	---	584	5,450	124	23
12	724	---	2	272	---	---
13	8,889	6,081	160	1,039	---	---
14	---	667	---	60	---	---
15 [2]	4,604	68	173	822	4	---
16	555	---	55	117	---	6
17	1,571	2,719	386	184	---	2
18	2,844	---	7	47	---	---
19	2,556	---	150	549	40	2
20	607	2,632	945	932	3	29
21	1,803	---	341	561	37	25
22 and 23	731	---	80	378	5	6
Total	249,272	100,532	22,827	100,876	1,317	1,969

District of origin [1]	Canadian Great Lakes commercial docks [3]	U.S. Great Lakes dock storage [3]	U.S. tidewater dock storage [3]	Overseas exports [4]	Net change in mine inventory	Total
1	135	−7	4	1,520	171	40,195
2	16	−16	---	---	−96	42,622
3 and 6	392	28	−1	1,282	29	53,227
4	76	−62	---	---	6	39,913
7	34	37	11	15,929	−36	40,090
8	423	−96	−4	16,015	22	136,778
9	---	−33	---	---	25	41,113
10	---	−103	---	---	−75	58,485
11	---	---	---	---	−15	15,511
12	---	---	---	---	---	998
13	---	---	---	---	1	16,170
14	---	---	---	---	---	727
15 [2]	---	---	---	---	6	5,677
16	---	---	---	---	−4	729
17	---	---	---	---	131	4,993
18	---	---	---	---	4	2,902
19	---	---	---	---	---	3,297
20	---	---	---	---	−16	5,132
21	---	---	---	---	−1	2,766
22 and 23	---	---	---	---	---	1,200
Total	1,076	−252	10	34,746	152	512,525

[1] Producing districts are defined in: Bureau of Mines. Bituminous Coal and Lignite Distribution Calendar Year 1965. Mineral Industry Survey, March 1966, 21 pp.
[2] Excludes Texas.
[3] Consumer use unknown.
[4] Excludes Canada; consumer use unknown.

Table 61.—Distribution of bituminous coal and lignite, 1965, by destination and consumer use

(Thousand net tons)

Destination	Total	Electric utilities	Coke and gas plants	Retail dealers	All others [1]
New England:					
Massachusetts	4,681	4,106	---	121	454
Connecticut	4,870	4,101	472	13	284
Maine, New Hampshire, Vermont, and Rhode Island	1,089	796	---	79	214
Middle Atlantic:					
New York	27,025	13,835	6,245	368	6,577
New Jersey	9,000	7,204	437	41	1,318
Pennsylvania	59,696	21,375	27,959	914	9,448
East North Central:					
Ohio	52,756	24,801	10,828	2,571	14,556
Indiana	36,885	17,953	11,924	1,248	5,760
Illinois	44,356	25,180	3,608	4,558	11,010
Michigan	33,411	16,966	5,338	2,032	9,075
Wisconsin	14,664	6,919	518	2,333	4,894
West North Central:					
Minnesota	7,406	4,043	952	713	1,698
Iowa	5,508	2,763	---	566	2,179
Missouri	8,243	5,541	186	348	2,168
North Dakota and South Dakota	2,211	1,357	---	437	417
Nebraska and Kansas	1,610	1,058	---	90	462
South Atlantic:					
Delaware and Maryland	13,288	6,994	5,116	224	954
District of Columbia	[2] 541	301	---	120	[2] 120
Virginia	13,887	7,574	266	910	5,137
West Virginia	19,337	8,702	5,432	279	4,924
North Carolina	12,376	9,368	---	626	2,382
South Carolina	4,301	2,387	---	264	1,650
Georgia and Florida	8,322	7,513	---	223	586
East South Central:					
Kentucky	16,834	11,937	1,919	520	2,458
Tennessee	13,896	10,622	181	762	2,331
Alabama and Mississippi	21,373	12,692	7,098	114	1,469
West South Central: Arkansas, Louisiana, Oklahoma, and Texas	1,166	---	996	28	142
Mountain:					
Colorado	4,500	2,456	1,322	369	353
Utah	2,868	377	1,897	209	385
Montana and Idaho	1,075	297	---	432	346
Wyoming	2,196	2,031	---	50	115
New Mexico	2,505	2,472	---	13	20
Arizona and Nevada	722	594	---	74	54
Pacific:					
Washington and Oregon	798	---	---	318	480
California	2,378	---	2,341	13	24
Alaska	789	434	---	40	315
Canada [3]	14,482	4,001	5,292	718	4,471
Mexico	60	---	---	---	60
Destinations not revealable	1,385	522	205	89	569
Destinations and/or consumer uses not available:					
Great Lakes movement:					
Canadian commercial docks	1,076	---	---	---	---
Vessel fuel	1,004	---	---	---	---
U.S. dock storage	−252	---	---	---	---
Tidewater movement:					
Overseas exports (except Canada)	34,746	---	---	---	---
Bunker fuel	13	---	---	---	---
U.S. dock storage	10	---	---	---	---
Railroad fuel:					
U.S. companies	1,241	---	---	---	---
Canadian companies	76	---	---	---	---
Coal used at mines and sales to employees	1,969	---	---	---	---
Net change in mine inventory	152	---	---	---	---
Total	512,525	---	---	---	---

[1] Excludes vessel fuel and bunker fuel, the destinations of which are not available.
[2] A considerable block of tonnage is included under "Destination not revealable."
[3] Excludes shipments to Canadian Great Lakes commercial docks and Canadian railroad companies.

Table 62.—Total bituminous coal and lignite shipments and percent of grand total shipments, 1960–65, by geographic division and State of destinaton

Geographic division and State of destination	Thousand tons						Percent of total					
	1960	1961	1962	1963	1964	1965	1960	1961	1962	1963	1964	1965
Total	416,119	403,262	424,627	456,137	485,465	512,525	100.0	100.0	100.0	100.0	100.0	100.0
New England	9,313	9,674	9,997	10,017	10,007	10,640	2.2	2.4	2.4	2.2	2.0	2.1
Massachusetts	4,031	4,014	4,342	4,346	4,160	4,681	1.0	1.0	1.0	1.0	.8	.9
Connecticut	3,758	3,956	4,047	4,341	4,767	4,870	.9	1.0	1.0	.9	1.0	1.0
Maine, New Hampshire, Vermont, and Rhode Island	1,524	1,704	1,608	1,330	1,080	1,089	.3	.4	.4	.3	.2	.2
Middle Atlantic	76,173	72,076	76,107	79,492	90,150	95,721	18.3	17.9	17.9	17.4	18.6	18.7
New York	22,980	21,092	21,737	22,417	25,932	27,025	5.5	5.2	5.1	4.9	5.3	5.3
New Jersey	5,910	6,455	6,901	6,874	7,526	9,000	1.4	1.6	1.6	1.5	1.6	1.8
Pennsylvania	47,283	44,529	47,469	50,201	56,692	59,696	11.4	11.1	11.2	11.0	11.7	11.6
East North Central	158,125	151,278	159,391	164,423	173,307	182,072	38.0	37.5	37.5	36.0	35.7	35.5
Ohio	49,624	44,998	48,324	49,157	51,092	52,756	11.9	11.2	11.4	10.8	10.5	10.3
Indiana	32,283	31,894	31,824	33,124	35,885	36,885	7.8	7.9	7.5	7.2	7.4	7.2
Illinois	38,705	37,479	39,259	39,086	41,466	44,356	9.3	9.3	9.2	8.6	8.5	8.6
Michigan	25,076	24,327	27,255	29,888	30,936	33,411	6.0	6.0	6.4	6.5	6.4	6.5
Wisconsin	12,437	12,580	12,729	13,168	13,928	14,664	3.0	3.1	3.0	2.9	2.9	2.9
West North Central	22,571	20,920	22,520	23,242	23,918	24,978	5.4	5.2	5.3	5.1	4.9	4.9
Minnesota	6,375	5,891	5,768	6,143	7,077	7,406	1.5	1.5	1.4	1.3	1.4	1.5
Iowa	4,946	4,439	5,047	5,271	4,849	5,508	1.2	1.1	1.2	1.2	1.0	1.1
Missouri	7,279	6,847	7,685	7,896	8,154	8,243	1.7	1.7	1.8	1.7	1.7	1.6
North Dakota and South Dakota	2,453	2,425	2,390	2,113	2,191	2,211	.6	.6	.5	.5	.5	.4
Nebraska and Kansas	1,518	1,318	1,630	1,819	1,647	1,610	.4	.3	.4	.4	.3	.3
South Atlantic	52,547	55,316	57,891	63,816	67,866	72,052	12.6	13.7	13.6	14.0	14.0	14.1
Delaware and Maryland	9,031	9,351	9,884	10,968	12,317	13,288	2.2	2.3	2.3	2.4	2.6	2.6
District of Columbia	1,002	968	813	[1] 718	[1] 638	[1] 541	.2	.2	.2	[1] .2	[1] .1	[1] .1
Virginia	11,685	12,343	12,823	13,323	13,787	13,887	2.8	3.1	3.0	2.9	2.8	2.7
West Virginia	13,778	14,661	15,272	16,742	18,205	19,337	3.3	3.6	3.6	3.7	3.8	3.8
North Carolina	8,667	9,295	9,980	11,187	11,595	12,376	2.1	2.3	2.4	2.4	2.4	2.4
South Carolina	3,591	3,800	3,921	4,442	4,401	4,301	.9	1.0	.9	1.0	.9	.9
Georgia and Florida	4,793	4,898	5,198	6,436	6,923	8,322	1.1	1.2	1.2	1.4	1.4	1.6
East South Central	41,556	40,771	42,709	47,418	49,849	52,103	10.0	10.1	10.0	10.4	10.3	10.2
Kentucky	11,270	11,340	11,873	15,453	16,148	16,834	2.7	2.8	2.8	3.4	3.3	3.3
Tennessee	14,786	13,588	14,120	14,952	14,075	13,896	3.6	3.4	3.3	3.3	2.9	2.7
Alabama and Mississippi	15,500	15,843	16,716	17,013	19,626	21,373	3.7	3.9	3.9	3.7	4.1	4.2
West South Central: Arkansas, Louisiana, Oklahoma, and Texas	1,114	802	839	802	1,099	1,166	.3	.2	.2	.2	.2	.2
Mountain	8,536	8,932	8,898	10,823	12,455	13,866	2.1	2.2	2.1	2.4	2.6	2.7
Colorado	2,887	3,242	3,340	3,752	3,877	4,500	.7	.8	.8	.8	.8	.9
Utah	3,377	3,046	2,417	2,334	2,706	2,868	.8	.8	.6	.5	.6	.6
Montana and Idaho	952	1,045	1,108	1,066	1,190	1,075	.2	.3	.3	.3	.3	.2
Wyoming	1,006	1,328	1,438	1,977	1,936	2,196	.3	.3	.3	.4	.4	.4
New Mexico	171	138	107	1,132	2,169	2,505	.1	([2])	([2])	.3	.4	.5
Arizona and Nevada	143	133	488	562	577	722	([2])	([2])	.1	.1	.1	.1
Pacific	2,271	3,162	2,390	2,518	2,789	3,176	.6	.8	.6	.6	.6	.6
Washington and Oregon	953	992	964	828	774	798	.3	.3	.2	.2	.2	.2
California	1,318	2,170	1,426	1,690	2,015	2,378	.3	.5	.4	.4	.4	.4

See footnotes at end of table.

Table 62.—Total bituminous coal and lignite shipments and percent of grand total shipments, 1960–65, by geopraphic division and State of destination—Continued

Geographic division and State of destination	Thousand tons						Percent of total					
	1960	1961	1962	1963	1964	1965	1960	1961	1962	1963	1964	1965
Alaska	720	710	893	855	842	789	.2	.2	.2	.2	.2	.1
Canada [3]	11,413	11,166	11,702	13,724	14,180	15,634	2.7	2.8	2.8	3.0	2.9	3.0
Mexico	57	55	53	48	54	60	(²)	(²)	(²)	(²)	(²)	(²)
Destinations not revealable	1,380	1,148	1,105	1,350	1,496	1,385	.3	.3	.2	.3	.3	.3
U.S. railroad fuel	2,124	1,782	1,602	1,452	1,321	1,241	.5	.4	.4	.3	.3	.2
U.S. Great Lakes dock storage	363	−718	−29	70	−327	−252	.1	−.2	(²)	(²)	−.1	(²)
U.S. tidewater dock storage	---	19	---	6	9	10	---	(²)	---	(²)	(²)	(²)
Vessel fuel	1,419	1,083	1,183	1,090	1,106	1,004	.3	.3	.3	.2	.2	.2
Bunker fuel	4	3	12	18	17	13	(²)	(²)	(²)	(²)	(²)	(²)
Overseas exports	24,818	23,780	27,041	33,317	33,733	34,746	6.0	5.9	6.4	7.3	7.0	6.8
Coal used at mines and sales to employees	1,676	1,366	1,272	1,753	1,956	1,969	.4	.3	.3	.4	.4	.4
Net change in mine inventory	−61	−63	−949	−97	−362	152	(²)	(²)	−.2	(²)	−.1	(²)

[1] A considerable block of tonnage is included under "Destinations not revealable."
[2] Less than one-tenth of one percent.
[3] Includes shipments to Canadian Great Lakes commercial docks and Canadian railroad companies.

Table 63.—The changing levels of bituminous coal and lignite markets—indexes of physical volumes shipped to markets, 1957 and 1961–65, by geographic division, State of destination, and consumer use

Geographic division, State of destination, and consumer use	1957 (thousand tons)	Index 1957 = 100 (except where noted)				
		1961	1962	1963	1964	1965
Total	493,895	81.6	86.0	92.4	98.3	103.8
Electric utilities	160,754	110.1	120.4	131.5	142.7	155.1
Coke and gas plants	112,901	69.8	68.6	73.3	84.7	89.0
Retail dealers	39,230	74.7	73.0	66.3	58.4	58.2
All others (includes vessel and bunker fuel)	108,711	83.4	87.6	90.8	92.2	92.8
Railroad fuel (U.S. and Canada)	9,581	19.6	18.0	16.1	15.0	13.7
Canadian Great Lakes commercial docks (consumer use not available)	2,785	43.6	26.1	21.3	30.0	38.6
U.S. Great Lakes dock storage (consumer use not available) [1]	NA	−236.2	−109.5	23.0	−207.6	−182.9
U.S. tidewater dock storage (consumer use not available) [2]	NA	73.1	---	23.1	34.6	38.5
Coal used at mines and sales to employees	3,125	43.7	40.7	56.1	62.6	63.0
Net change in mine inventory	1,142	−105.5	−183.1	−108.5	−131.7	13.3
Overseas exports (excludes Canada—consumer use not available)	55,666	42.7	48.6	59.9	60.6	62.4
New England	11,909	81.2	83.9	84.1	84.0	89.3
Electric utilities	6,012	111.8	120.2	129.2	136.4	149.8
Coke and gas plants	1,345	35.3	35.3	35.1	35.4	35.1
Retail dealers	1,279	35.4	35.2	23.5	19.2	16.7
All others	3,273	61.8	57.0	45.1	33.2	29.1
Massachusetts	5,354	75.0	81.1	81.2	77.7	87.4
Electric utilities	2,575	103.8	119.1	133.3	133.0	159.5
Coke and gas plants	751	.0	.0	.0	.0	.0
Retail dealers	755	36.7	38.3	21.5	21.2	16.0
All others	1,273	83.7	77.5	59.0	45.1	35.7
Connecticut	4,105	96.4	98.6	105.7	116.1	118.6
Electric utilities	2,567	121.1	127.2	136.0	155.2	159.8
Coke and gas plants	594	80.0	75.3	79.5	80.1	79.5
Retail dealers	139	44.6	46.8	34.5	18.7	9.4
All others	805	38.5	33.5	41.0	34.8	35.3
Maine, New Hampshire, Vermont, and Rhode Island	2,450	69.6	65.6	54.3	44.1	44.4
Electric utilities	870	108.3	102.6	97.2	90.7	91.5
Retail dealers	385	29.6	24.9	23.4	15.6	20.5
All others	1,195	54.2	51.0	33.0	19.3	17.9
Middle Atlantic	92,596	77.8	82.2	85.8	97.4	103.4
Electric utilities	31,662	97.2	104.5	108.3	121.4	134.0
Coke and gas plants	38,448	61.8	62.5	68.0	83.5	90.1
Retail dealers	2,498	65.7	61.6	54.3	45.8	53.0
All others	19,988	79.6	87.2	88.5	92.3	86.8
New York	26,753	78.8	81.3	83.8	96.9	101.0
Electric utilities	12,335	85.3	88.8	91.1	104.4	112.2
Coke and gas plants	5,693	66.4	70.2	70.6	100.5	109.7
Retail dealers	769	56.6	60.7	48.5	39.9	47.9
All others	7,956	79.8	79.5	85.3	88.2	82.7
New Jersey	7,814	82.6	88.3	88.0	96.3	115.2
Electric utilities	4,284	100.9	108.6	115.1	133.7	168.2
Coke and gas plants	1,249	45.1	35.2	31.8	28.0	35.0
Retail dealers	130	51.5	37.7	44.6	20.0	31.5
All others	2,151	69.8	81.9	69.2	66.1	61.3
Pennsylvania	58,029	76.7	81.8	86.5	97.7	102.9
Electric utilities	15,043	105.8	116.3	120.6	131.9	142.1
Coke and gas plants	31,506	61.6	62.2	68.9	82.6	88.7
Retail dealers	1,599	71.2	64.0	57.9	50.0	57.2
All others	9,881	81.5	94.6	95.3	101.3	95.6
East North Central	[3] 170,697	88.6	93.4	96.3	101.5	106.7
Electric utilities	66,436	102.7	112.5	118.8	128.1	138.2
Coke and gas plants	38,757	70.0	68.4	71.5	80.9	83.1
Retail dealers	21,321	76.0	74.8	66.7	58.7	59.8
All others	[3] 44,183	90.0	95.5	98.6	100.3	102.5
Ohio	55,612	80.9	86.9	88.4	91.9	94.9
Electric utilities	20,193	100.2	108.5	113.9	117.7	122.8
Coke and gas plants	15,661	58.3	60.5	57.9	66.8	69.1
Retail dealers	5,077	57.4	61.1	51.7	49.3	50.6
All others	14,681	86.6	94.1	98.6	97.8	99.1
Indiana	34,938	91.3	91.1	94.8	102.7	105.6
Electric utilities	12,853	106.8	115.2	119.5	132.4	139.7
Coke and gas plants	13,736	78.3	69.9	77.9	86.3	86.8
Retail dealers	2,796	72.6	69.0	62.2	48.7	44.6
All others	5,553	96.9	99.0	96.0	101.7	103.7

See footnotes at end of table.

Table 63.—The changing levels of bituminous coal and lignite markets—indexes of physical volumes shipped to markets, 1957 and 1961–65, by geographic division, State of destination, and consumer use—Continued

Geographic division, State of destination, and consumer use	1957 (thousand tons)	Index 1957 = 100 (except where noted)				
		1961	1962	1963	1964	1965
Illinois	[3] 42,718	87.7	91.9	91.5	97.1	103.8
Electric utilities	18,584	103.2	109.7	112.6	123.7	135.5
Coke and gas plants	3,925	70.7	73.2	71.3	84.3	91.9
Retail dealers	8,623	66.1	67.3	61.3	55.8	52.9
All others	[3] 11,586	84.8	88.1	87.0	89.4	95.0
Michigan	26,255	92.7	103.8	113.8	117.8	127.3
Electric utilities	9,839	101.6	124.8	138.0	149.3	172.4
Coke and gas plants	4,877	84.5	87.1	98.7	108.9	109.5
Retail dealers	3,368	74.6	70.0	64.0	52.6	60.3
All others	8,171	94.2	102.5	114.3	112.2	111.1
Wisconsin	11,174	112.6	113.9	117.8	124.6	131.2
Electric utilities	4,967	101.6	108.1	122.6	134.1	139.3
Coke and gas plants	558	62.4	52.9	60.9	74.7	92.8
Retail dealers	1,457	209.0	189.8	166.0	142.5	160.1
All others	4,192	98.8	102.5	103.1	113.8	116.7
West North Central	[3] 20,824	100.5	108.1	111.6	114.9	119.9
Electric utilities	8,278	123.9	147.6	159.2	166.9	178.3
Coke and gas plants	1,518	39.0	50.6	51.1	78.3	75.0
Retail dealers	4,079	89.5	79.9	63.8	53.4	52.8
All others	[3] 6,949	92.4	90.3	96.2	96.9	99.6
Minnesota	5,332	110.5	108.2	115.2	132.7	138.9
Electric utilities	1,810	154.5	169.0	176.7	212.7	223.4
Coke and gas plants	1,206	43.2	52.4	55.0	85.5	78.9
Retail dealers	553	178.7	131.5	122.1	105.1	128.9
All others	1,763	90.0	76.7	91.1	91.7	96.3
Iowa	[3] 4,878	91.0	103.5	108.1	99.4	112.9
Electric utilities	1,846	100.6	127.1	137.3	125.6	149.7
Retail dealers	1,254	63.2	63.9	56.9	43.7	45.1
All others	[3] 1,778	100.7	106.8	113.7	111.5	122.6
Missouri	6,862	99.8	112.0	115.1	118.1	120.1
Electric utilities	2,605	142.2	176.2	200.2	208.0	212.7
Coke and gas plants	312	22.8	43.6	36.2	50.6	59.6
Retail dealers	1,495	68.3	61.7	36.2	30.6	23.3
All others	2,450	83.7	83.1	82.8	86.6	88.5
North Dakota and South Dakota	2,416	100.4	98.9	87.5	90.7	91.5
Electric utilities	1,378	99.3	103.7	89.5	94.6	98.5
Retail dealers	517	126.5	118.6	101.4	93.0	84.5
All others	521	77.2	66.8	68.3	77.9	80.0
Nebraska and Kansas	1,336	98.7	122.0	136.2	123.3	120.5
Electric utilities	639	82.6	124.3	156.2	144.8	165.6
Retail dealers	260	75.4	75.8	56.9	43.1	34.6
All others	437	135.9	146.2	154.0	139.6	105.7
South Atlantic	52,560	105.2	110.1	121.4	129.1	137.1
Electric utilities	22,251	134.0	143.6	161.7	174.0	192.5
Coke and gas plants	11,321	73.4	73.5	79.6	90.5	95.5
Retail dealers	4,765	66.3	70.0	67.2	66.3	55.5
All others	14,223	98.6	100.5	109.9	110.7	110.8
Delaware and Maryland	10,358	90.3	95.4	105.9	118.9	128.3
Electric utilities	3,000	137.6	144.2	167.3	192.5	233.1
Coke and gas plants	5,414	76.3	82.6	81.5	92.8	94.5
Retail dealers	420	51.0	56.9	80.2	84.3	53.3
All others	1,524	57.6	55.6	78.9	76.4	62.6
District of Columbia	1,097	88.2	74.1	[4] 65.5	[4] 58.2	[4] 49.3
Electric utilities	609	67.7	52.5	59.1	61.4	49.4
Retail dealers	188	77.1	78.7	80.3	72.3	63.8
All others	300	137.0	115.0	[4] 69.0	[4] 42.7	[4] 40.0
Virginia	10,553	117.0	121.5	126.2	130.6	131.6
Electric utilities	4,435	151.2	162.2	166.9	176.4	170.8
Coke and gas plants	165	46.7	19.4	30.3	76.4	161.2
Retail dealers	1,756	64.5	62.6	59.3	61.4	51.8
All others	4,197	105.5	107.1	115.1	113.4	122.4
West Virginia	15,771	93.0	96.8	106.2	115.4	122.6
Electric utilities	6,290	103.2	111.2	114.2	121.3	138.3
Coke and gas plants	5,742	71.4	66.4	79.2	88.7	94.6
Retail dealers	302	82.8	112.9	94.0	85.4	92.4
All others	3,437	111.1	119.9	137.5	152.0	143.3
North Carolina	8,716	106.6	114.5	128.4	133.0	142.0
Electric utilities	4,953	123.0	135.4	160.0	171.4	189.1
Retail dealers	1,248	66.8	70.6	63.9	59.8	50.2
All others	2,515	94.2	95.1	98.0	93.9	94.7
South Carolina	3,050	124.6	128.6	145.6	144.3	141.0
Electric utilities	856	222.8	236.8	289.0	303.9	278.9
Retail dealers	321	84.1	90.0	91.0	94.1	82.2
All others	1,873	86.7	85.7	89.5	80.0	88.1

See footnotes at end of table.

Table 63.—The changing levels of bituminous coal and lignite markets—indexes of physical volumes shipped to markets, 1957 and 1961–65, by geographic division, State of destination, and consumer use—Continued

Geographic division, State of destination, and consumer use	1957 (thousand tons)	Index 1957 = 100 (except where noted)				
		1961	1962	1963	1964	1965
South Atlantic—Continued						
Georgia and Florida	3,015	162.5	172.4	213.5	229.6	276.0
Electric utilities	2,108	193.8	207.8	266.4	286.1	356.4
Retail dealers	530	59.4	63.4	56.4	53.8	42.1
All others	377	132.1	127.9	138.2	160.7	155.4
East South Central	43,283	94.2	98.7	109.6	115.2	120.4
Electric utilities	23,572	115.0	122.4	137.6	145.3	149.5
Coke and gas plants	10,380	69.8	70.3	73.6	81.7	88.6
Retail dealers	2,494	74.7	72.6	80.2	62.1	56.0
All others	6,837	66.6	69.3	78.1	81.5	91.5
Kentucky	11,167	101.5	106.3	138.4	144.6	150.7
Electric utilities	6,758	108.1	117.8	154.4	165.4	176.6
Coke and gas plants	1,683	91.0	83.8	111.5	110.9	114.0
Retail dealers	834	99.6	77.2	95.3	77.3	62.4
All others	1,892	88.3	98.4	123.9	129.8	129.9
Tennessee	15,104	90.0	93.5	99.0	93.2	92.0
Electric utilities	9,876	107.2	112.8	119.4	112.1	107.6
Coke and gas plants	258	89.9	96.5	84.5	59.3	70.2
Retail dealers	1,206	69.4	71.6	72.1	61.2	63.2
All others	3,764	51.4	49.5	55.0	56.2	61.9
Alabama and Mississippi	17,012	93.1	98.3	100.0	115.4	125.6
Electric utilities	6,938	133.0	140.7	147.1	173.0	182.9
Coke and gas plants	8,439	64.9	66.8	65.7	76.5	84.1
Retail dealers	454	43.0	66.5	73.8	36.6	25.1
All others	1,181	80.0	85.8	78.6	84.8	124.4
West South Central: Arkansas, Louisiana, Oklahoma, and Texas	1,868	42.9	44.9	42.9	58.8	62.4
Electric utilities [5]	65	.0	.0	100.0	75.0	.0
Coke and gas plants	1,050	49.0	61.5	58.7	82.5	94.9
Retail dealers	161	28.0	28.6	23.0	19.3	17.4
All others	592	41.0	24.8	22.3	31.1	24.0
Mountain	8,779	101.7	101.4	123.3	141.9	157.9
Electric utilities	1,437	237.1	263.6	405.8	485.0	572.5
Coke and gas plants	3,772	76.5	60.9	65.3	74.1	85.3
Retail dealers	1,350	82.7	88.4	83.1	86.3	85.0
All others	2,220	68.6	73.0	63.2	68.7	57.3
Colorado	3,264	99.3	102.3	115.0	118.8	137.9
Electric utilities	687	205.1	227.4	264.3	281.2	357.5
Coke and gas plants	1,324	75.4	70.4	85.6	83.5	99.8
Retail dealers	326	85.9	100.0	87.7	102.1	113.2
All others	927	59.9	56.1	55.7	54.7	38.1
Utah	3,748	81.3	64.5	62.3	72.2	76.5
Electric utilities	367	150.4	124.0	118.8	111.7	102.7
Coke and gas plants	2,448	77.1	55.8	54.4	69.0	77.5
Retail dealers	334	75.1	81.7	73.1	69.5	62.6
All others	599	59.3	54.1	53.9	62.4	64.3
Montana and Idaho	923	113.2	120.0	115.5	128.9	116.5
Electric utilities [6]	1	149.2	164.8	160.3	164.2	165.9
Retail dealers	593	80.6	80.9	80.8	80.6	72.8
All others	329	91.2	101.2	91.2	127.1	105.2
Wyoming	607	218.8	236.9	325.7	318.9	361.8
Electric utilities	340	336.2	326.8	520.3	518.2	597.4
Retail dealers	61	91.8	98.4	86.9	82.0	82.0
All others	206	62.6	129.6	75.2	60.2	55.8
New Mexico [7]	92	12.2	9.5	100.0	191.6	221.3
Electric utilities [7]	37	3.0	2.8	100.0	195.0	227.8
Retail dealers	12	291.7	250.0	183.3	150.0	108.3
All others	43	162.8	109.3	58.1	81.4	46.5
Arizona and Nevada	145	91.7	336.6	387.6	397.9	497.9
Electric utilities [8]	5	.9	100.0	131.0	136.1	177.3
Retail dealers	24	70.8	100.0	158.3	225.0	308.3
All others	116	97.4	111.2	73.3	57.8	46.6
Pacific	3,142	100.6	76.1	80.1	88.8	101.1
Electric utilities	4	.0	.0	.0	.0	.0
Coke and gas plants	1,708	124.2	80.9	96.8	115.7	137.1
Retail dealers	377	106.9	77.7	72.4	75.9	87.8
All others	1,053	60.6	68.0	56.2	50.0	47.9
Washington and Oregon	1,324	74.9	72.8	62.5	58.5	60.3
Electric utilities	3	.0	.0	.0	.0	.0
Retail dealers	367	108.2	78.2	73.3	75.7	86.6
All others	954	62.4	71.0	58.6	52.0	50.3
California	1,818	119.4	78.4	93.0	110.8	130.8
Electric utilities	1	.0	.0	.0	.0	.0
Coke and gas plants	1,708	124.2	80.9	96.8	115.7	137.1
Retail dealers	10	60.0	60.0	40.0	80.0	130.0
All others	99	43.4	39.4	33.3	31.3	24.2

See footnotes at end of table.

Table 63.—The changing levels of bituminous coal and lignite markets—indexes of physical volumes shipped to markets, 1957 and 1961–65, by geographic division, State of destination, and consumer use—Continued

Geographic division, State of destination, and consumer use	1957 (thousand tons)	Index 1957 = 100 (except where noted)				
		1961	1962	1963	1964	1965
Alaska	829	85.6	107.7	103.1	101.6	95.2
Electric utilities	470	43.8	61.5	71.5	75.3	92.3
Retail dealers	49	134.7	155.1	108.2	89.8	81.6
All others	310	141.3	170.3	150.3	143.2	101.6
Canada [9]	17,878	62.5	65.5	76.8	79.3	87.4
Electric utilities	567	21.5	206.2	437.9	560.0	705.6
Coke and gas plants	4,602	114.2	109.6	122.8	120.5	115.0
Retail dealers	857	75.5	74.6	94.6	64.4	83.8
All others	7,183	53.4	55.7	57.0	55.0	62.2
Canadian Great Lakes commercial docks (consumer use not available)	2,785	43.6	26.1	21.3	30.0	38.6
Canadian railroad companies	1,884	5.0	6.5	4.9	6.2	4.0
Mexico [10]	NA	96.5	93.0	84.2	94.7	105.3
All others [10]	NA	96.5	93.0	84.2	94.7	105.3
Destinations not revealable [11]	---	83.2	80.1	97.8	108.4	100.4
Electric utilities [11]	---	74.6	42.1	34.2	61.8	105.0
Coke and gas plants [11]	---	141.2	172.7	161.0	161.5	54.8
Retail dealers [11]	---	69.7	32.3	32.3	35.4	89.9
All others [11]	---	43.9	53.2	133.2	134.1	138.8
Destinations not available:						
Great Lakes vessel fuel [12]	1,859	58.3	63.6	58.6	59.5	54.0
Tidewater bunker fuel [12]	41	7.3	29.3	43.9	41.5	31.7
Railroad fuel, United States companies [13]	7,697	23.2	22.4	18.9	17.2	16.1

NA Not available.
[1] For Great Lakes dock storage the annual base period is 1959=100. The 1959 annual tonnage was 304 tons.
[2] For tidewater dock storage the annual base period is 1959=100. The 1959 annual tonnage was 26 tons.
[3] District 15 shipments to Illinois included with Iowa.
[4] A considerable block of tonnage is included under "Destinations not revealable."
[5] For electric utilities in Arkansas, Louisiana, Oklahoma, and Texas the annual base period is 1963=100. The 1963 tonnage shipped to electric utilities was 24,000 tons.
[6] For electric utilities in Montana and Idaho the annual base period is 1959=100. The 1959 tonnage shipped to electric utilities was 179,000 tons.
[7] For total shipments and electric utilities to New Mexico the annual base period is 1963=100. Total shipments to New Mexico were 1,132,000 tons and for electric utilities, 1,085,000 tons.
[8] For electric utilities in Arizona and Nevada the annual base period is 1962=100. The 1962 annual tonnage shipped to electric utilities was 335,000 tons.
[9] Includes shipments to Canadian Great Lakes commercial docks and Canadian railroad companies.
[10] Since tonnages for Mexico were first published in 1960, yearly indexes are based on 1960=100. In thousands of tons, 1960 tons were total 57, all others 57.
[11] Since "Destinations not revealable" were first published during 1960, the calendar year indexes are based on 1960=100. In thousands of tons these figures are as follows: Calendar year 1960 total not revealable 1,380, electric utilities 497, coke and gas plants 374, retail dealers 99, all other 410.
[12] Included in summary at beginning of table in all others.
[13] Included in summary at beginning of table in railroad fuel.

RELATIVE RATE OF GROWTH OF MINERAL FUELS AND WATERPOWER

Information on the trends in consumption of the various energy fuels and waterpower is presented in the Review of Mineral-Fuel Industries, 1965 Minerals Yearbook, volume 2.

STOCKS

The figures on stocks are based on complete coverage for all categories except "Other manufacturing and mining industries" and "Retail dealer stocks." Stocks for these two categories are based on samples, and the statistical procedure followed is that for calculating total consumption.

Table 64.—Stocks of bituminous coal and lignite in the hands of commercial consumers and in the retail dealers' yards in the United States

Date	Total stocks (net tons)	Days' supply at current rate of consumption on date of stocktaking						
		Electric power utilities	Manufacturing and mining industries				Retail dealers	Total
			Oven coke plants	Steel and rolling mills	Cement mills	Other manu-facturing and mining industries		
1964:								
Jan. 31	66,536,000	71	36	18	55	39	5	52
Feb. 29	64,430,000	70	36	17	47	37	4	51
Mar. 31	63,041,000	73	37	16	40	38	4	54
Apr. 30	65,043,000	81	37	19	40	43	7	59
May 31	68,619,000	89	37	23	41	49	19	65
June 30	70,700,000	82	39	25	40	51	19	64
July 31	65,616,000	77	32	26	39	53	18	60
Aug. 31	67,682,000	80	34	27	39	48	12	61
Sept. 30	71,892,000	85	35	26	41	49	9	63
Oct. 31	75,153,000	89	37	24	43	44	6	62
Nov. 30	77,283,000	88	39	21	45	45	7	63
Dec. 31	75,342,000	77	40	20	42	41	4	56
1965:								
Jan. 31	70,435,000	71	37	16	45	39	3	52
Feb. 28	67,141,000	67	35	16	39	37	3	49
Mar. 31	64,923,000	66	36	18	32	37	2	49
Apr. 30	65,489,000	74	36	22	30	41	5	55
May 31	68,692,000	79	37	23	35	47	13	60
June 30	71,418,000	78	38	24	38	47	17	60
July 31	66,149,000	74	30	25	40	47	14	57
Aug. 31	69,308,000	73	33	26	42	49	11	57
Sept. 30	70,418,000	76	34	24	41	49	7	58
Oct. 31	73,000,000	80	38	22	40	43	5	59
Nov. 30	75,226,000	78	42	21	43	39	5	58
Dec. 31	77,393,000	73	45	20	57	40	4	56

PRICES

Table 65.—Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, by States

State	1964				1965			
	Under-ground	Strip	Auger	Total	Under-ground	Strip	Auger	Total
Alabama	$7.62	$4.69	$6.90	$6.83	$8.22	$4.99	$6.67	$7.16
Alaska	---	6.72	---	6.72	---	6.82	---	6.82
Arkansas	7.30	6.96	---	7.08	7.46	7.18	---	7.27
Colorado	5.92	3.43	---	5.38	5.73	3.35	---	5.10
Georgia	3.82	---	---	3.82	---	---	---	---
Illinois	3.76	3.81	---	3.79	3.78	3.72	---	3.74
Indiana	4.09	3.71	---	3.80	4.07	3.81	---	3.85
Iowa	4.09	3.43	---	3.54	3.98	3.44	---	3.54
Kansas	---	4.55	---	4.55	---	4.64	---	4.64
Kentucky	4.19	3.11	2.88	3.75	4.24	3.13	3.04	3.78
Maryland	4.24	3.83	---	3.97	4.02	3.43	3.00	3.63
Missouri	4.76	4.08	---	4.08	4.84	4.14	---	4.15
Montana:								
Bituminous	7.57	1.90	---	7.40	7.23	7.53	---	7.24
Lignite	4.57	1.90	---	1.95	5.72	1.93	---	1.96
Total Montana	7.22	1.90	---	2.68	7.16	1.96	---	2.88
New Mexico	8.89	2.37	---	3.29	9.07	2.44	---	3.33
North Dakota (lignite)	4.62	2.14	---	2.15	4.57	2.14	---	2.14
Ohio	4.26	3.48	3.23	3.69	4.31	3.49	3.17	3.71
Oklahoma	7.43	5.30	---	5.32	7.50	5.65	7.41	5.67
Pennsylvania	5.75	3.62	3.80	5.07	5.68	3.69	3.69	5.07
South Dakota (lignite)	---	4.85	---	4.85	---	4.87	---	4.87
Tennessee	3.98	3.50	3.33	3.79	3.80	3.20	3.32	3.57
Utah	7.03	---	---	7.03	6.37	---	---	6.37
Virginia	4.01	2.85	3.21	3.89	4.27	2.98	2.90	4.09
Washington	8.45	---	---	8.45	9.09	8.80	---	9.07
West Virginia	5.02	3.72	3.75	4.90	5.00	3.64	3.82	4.87
Wyoming	6.11	3.03	---	3.15	6.10	3.00	---	3.11
Total	4.92	3.55	3.35	4.45	4.93	3.57	3.36	4.44

Table 66.—Production and average value per ton, f.o.b. mines, of bituminous coal and lignite sold in open market and not sold in open market, 1965, by States

State	Production					Average value per ton, f.o.b. mines		
	Sold in open market		Not sold in open market					
	Net tons	Percentage of total	Net tons	Percentage of total	Total (net tons)	Sold in open market	Not sold in open market	Total
Alabama	7,517,483	50.7	7,314,109	49.3	14,831,592	$5.82	$8.54	$7.16
Alaska	893,182	100.0	----	----	893,182	6.82	----	6.82
Arkansas	225,888	100.0	----	----	225,888	7.27	----	7.27
Colorado	3,614,689	75.5	1,175,769	24.5	4,790,458	4.67	6.42	5.10
Illinois	58,483,208	100.0	----	----	58,483,208	3.74	----	3.74
Indiana	15,565,409	100.0	----	----	15,565,409	3.85	---	3.85
Iowa	1,043,242	100.0	----	----	1,043,242	3.54	---	3.54
Kansas	1,309,744	100.0	----	----	1,309,744	4.64	----	4.64
Kentucky	78,904,368	92.0	6,861,343	8.0	85,765,711	3.60	5.90	3.78
Maryland	1,209,733	100.0	----	----	1,209,733	3.63	----	3.63
Missouri	3,563,743	100.0	----	----	3,563,743	4.15	----	4.15
Montana:								
Bituminous	62,934	99.6	254	.4	63,188	7.24	8.22	7.24
Lignite	301,280	100.0	5	----	301,285	1.96	5.40	1.96
Total Montana	364,214	99.9	259	.1	364,473	2.87	8.17	2.88
New Mexico	2,810,803	87.5	401,110	12.5	3,211,913	2.47	9.41	3.33
North Dakota (lignite)	2,666,099	97.6	65,836	2.4	2,731,935	2.16	1.40	2.14
Ohio	33,623,566	85.4	5,766,155	14.6	39,389,721	3.79	3.25	3.71
Oklahoma	974,012	100.0	----	----	974,012	5.67	----	5.67
Pennsylvania	49,321,386	61.4	30,987,063	38.6	80,308,449	4.19	6.48	5.07
South Dakota (lignite)	10,000	100.0	----	----	10,000	4.87	----	4.87
Tennessee	5,824,104	99.3	41,069	.7	5,865,173	3.57	3.44	3.57
Utah	2,366,356	47.4	2,625,647	52.6	4,992,003	4.57	8.00	6.37
Virginia	32,952,815	96.8	1,100,100	3.2	34,052,915	4.01	6.48	4.09
Washington	54,758	100.0	----	----	54,758	9.07	----	9.07
West Virginia	129,463,736	86.8	19,727,472	13.2	149,191,208	4.71	5.92	4.87
Wyoming	1,470,794	45.1	1,788,999	54.9	3,259,793	3.64	2.68	3.11
Total	434,233,332	84.8	77,854,931	15.2	512,088,263	4.13	6.21	4.44

LIGNITE

Table 67.—Summary of operations at lignite mines in the United States, 1965, by States [1]

Item	Montana	North Dakota	South Dakota	Total
UNDERGROUND MINES				
Number of mines	2	1	---	3
Shot from solid ... net tons	2,970	1,341	---	4,311
Cut by machines ... do	---	---	---	---
Total production ... do	2,970	1,341	---	4,311
Number of cutting machines	---	---	---	---
Average output per machine ... net tons	---	---	---	---
Underground production cut by machine ... percent	---	---	---	---
Average value per ton	$5.72	$4.57	---	$5.36
Average number of men working daily	7	2	---	9
Average number of days worked	101	82	---	97
Number of man-days worked	706	164	---	870
Average tons per man per day	4.21	8.18	---	4.96

See footnotes at end of table.

Table 67.—Summary of operations at lignite mines in the United States, by 1965, by States[1]—Continued

Item	Montana	North Dakota	South Dakota	Total
STRIP MINES				
Number of strip mines	1	28	1	30
Production net tons	298,315	2,730,594	10,000	3,038,909
Average value per ton	$1.93	$2.14	$4.87	$2.13
Number of shovels and draglines	2	52	2	56
Average number of men working daily	16	305	4	325
Average number of days worked	249	195	125	197
Number of man-days worked	3,978	59,488	500	63,966
Average tons per man per day	74.99	45.90	20.00	47.51
TOTAL, ALL LIGNITE MINES				
Number of mines	3	29	1	33
Production (net tons):				
Shipped by rail [2]	296,554	2,030,820	---	2,327,374
Shipped by truck	4,726	383,883	10,000	398,609
Used at mines [3]	5	317,232	---	317,237
Total	301,285	2,731,935	10,000	3,043,220
Average value per ton	$1.96	$2.14	$4.87	$2.13
Average number of men working daily	23	307	4	334
Average number of days worked	204	194	125	194
Number of man-days worked	4,684	59,652	500	64,836
Average tons per man per day	64.32	45.80	20.00	46.94

[1] Exclusive of Texas (lignite).
[2] Includes coal loaded at mines directly into railroad cars and hauled by trucks to railroad sidings.
[3] Includes coal used at mine for power and heat, made into beehive coke at mine, used by mine employees, used for all other purposes at mine, and transported from mine to point of use by conveyor or tram.

FOREIGN TRADE

Exports have become an important item of foreign trade, particularly since the close of World War II, and contribute substantially to our international balance of payments.

The United States is the world's largest coal exporter and supplies approximately 50 foreign countries with coals of varying quantities and qualities. In 1965 90 percent of U.S. coal exports were shipped to Canada, nations comprising the European Coal and Steel Community, and Japan. The price of U.S. coal at ports in Europe is competitive with indigenous and other imported coals. Some excellent quality U.S. coals are being delivered to Europe at from $1 to $4 per ton below the mine price of indigenous coals. The production cost of indigenous European coal continues to rise and the gap between costs of U.S. imports and indigenous prices is expected to widen further. Also, ocean transportation costs have decreased as a result of more efficient haulage in larger ocean carriers, and this trend is expected to continue. Although exports fluctuated widely in previous years as a result of emergencies abroad, since 1961, with no significant emergencies, they have increased steadily, and there is reason to believe that because of its high quality and economic price U.S. coal has become an integral part of the energy structure of Europe, Japan, and Canada, and that the trend which started in 1961 will continue.

Imports of bituminous coal and lignite are very small.

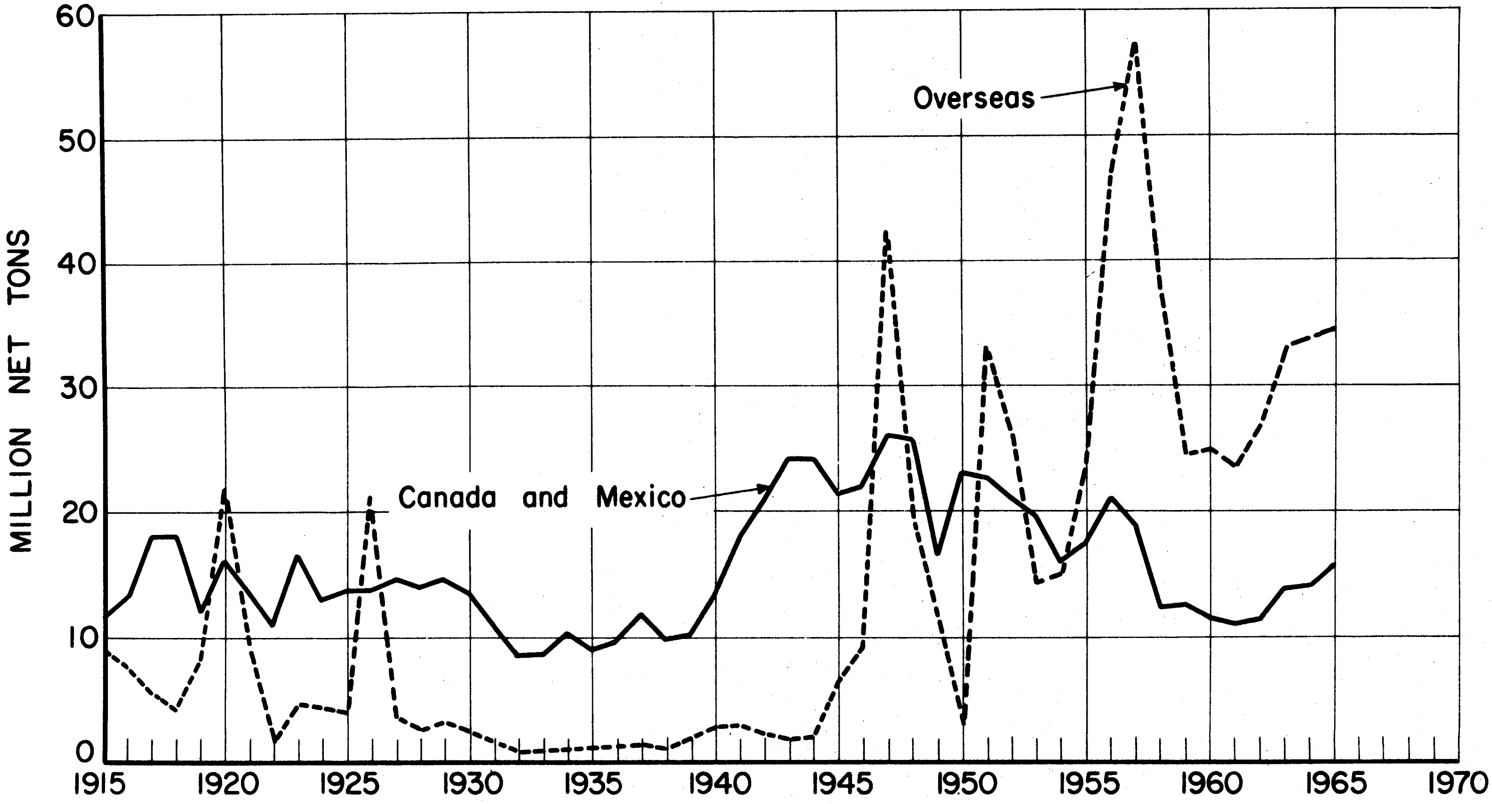

Figure 15.—Exports of bituminous coal and lignite from the United States to Canada and Mexico and overseas, 1915–65.

Table 68.—Bituminous coal[1] imported for consumption in the United States, by countries and customs districts

(Net tons)

Country and customs district	1963	1964	1965
Country:			
North America:			
Canada	267,315	292,982	184,328
Mexico	---	51	---
South America: Brazil	---	---	55
Europe:			
Germany, West	34	---	---
United Kingdom	3	---	3
Asia: Japan	---	26	13
Total	267,352	293,059	184,399
Customs district:			
Alaska	10	10	5
Buffalo	51	61	---
Dakota	782	212	1,255
Duluth and Superior	---	---	368
Hawaii	---	76	13
Laredo	---	51	---
Los Angeles	3	---	3
Maine and New Hampshire	262,720	276,471	166,747
Michigan	---	---	1,000
New York	---	---	55
Montana and Idaho	3,752	14,112	14,907
New Orleans	34	---	---
Ohio	---	65	---
Washington	---	2,001	46
Total	267,352	293,059	184,399

[1] Includes slack, culm, and lignite.

Table 69.—Exports of bituminous coal, by country groups

(Thousand net tons)

Year	Canada (including Newfoundland) and Mexico	Overseas (all other countries)[1]: West Indies and Central America[2]	Miquelon, Bermuda, and Greenland	South America	Europe	Asia	Africa	Total overseas	Grand total
1956–60 (average)	15,125	29	2	2,045	31,962	4,493	162	38,692	53,817
1961	11,223	3	3	1,786	15,275	6,617	63	23,747	34,970
1962	11,461	10	5	2,159	18,284	6,467	27	26,952	38,413
1963	13,809	6	5	1,933	25,218	6,064	43	33,269	47,078
1964	r 14,241	2	3	2,099	r 25,092	6,515	17	33,732	47,969
1965	15,721	2	3	1,996	24,957	7,491	11	34,460	50,181

r Revised.
[1] Oceania, no transactions except 1961, less than ½ unit.
[2] Includes Panama.

Table 70.—Bituminous coal exported from the United States, by countries [1]
(Net tons)

Country	1962	1963	1964	1965
North America:				
Canada	11,409,746	13,762,062	r 14,187,335	15,660,773
Central America:				
Guatemala	3,208	406	---	390
Honduras	439	255	450	302
Other	356	3,603	225	339
Mexico	51,056	47,036	53,453	60,439
Miguelon	4,759	5,004	3,415	2,832
West Indies: British:				
Trinidad and Tobago	1,795	444	878	1,082
Other	3,110	404	30	105
Dominican Republic	---	---	89	984
French	623	985	326	---
Netherlands Antilles	521	28	---	---
Total	11,475,613	13,820,227	r 14,246,201	15,727,246
South America:				
Argentina	670,727	531,390	765,133	619,662
Brazil	1,316,150	1,155,806	1,101,308	1,210,517
Chile	114,126	180,193	183,783	126,194
Uruguay	57,779	47,684	47,333	37,015
Other	438	18,151	1,932	2,330
Total	2,159,220	1,933,224	2,099,489	1,995,718
Europe:				
Austria	251,949	44,790	30,979	---
Belgium-Luxembourg	1,083,949	2,107,443	2,184,827	2,214,749
Czechoslovakia	13,761	76,718	---	---
Denmark	37,570	43,785	17,505	5,833
France	710,080	2,002,294	1,923,835	2,069,602
Germany:				
East	---	---	267,921	120,614
West	4,812,249	5,508,144	5,161,464	4,729,895
Greece	57,554	70,563	35,181	26,328
Ireland	241,011	464,269	325,290	313,115
Italy	5,837,218	7,611,833	7,859,796	8,930,666
Netherlands	3,186,593	4,170,478	r 3,985,711	3,371,223
Norway	17,453	13,386	93,116	164,663
Portugal	125,398	229,095	162,941	103,604
Spain	766,095	1,405,748	1,406,607	1,376,609
Sweden	725,715	874,763	990,733	870,398
Switzerland	---	86,995	21,601	38,816
Yugoslavia	414,514	404,220	472,224	558,394
Other	2,501	103,247	151,850	62,161
Total	18,283,610	25,217,771	r 25,091,581	24,956,670
Africa:				
Libya	16,408	10,405	51	310
United Arab Republic (Egypt)	11,362	11,233	12,259	---
Other	---	21,273	5,050	10,246
Total	27,770	42,911	17,360	10,556
Asia:				
Japan	6,465,395	6,052,859	6,514,724	7,491,114
Other	1,763	11,443	68	57
Total	6,467,158	6,064,302	6,514,792	7,491,171
Grand total	38,413,371	47,078,435	47,969,423	50,181,361

r Revised.

[1] Amounts stated do not include fuel or bunker coal loaded on vessels engaged in foreign trade, which aggregated 213,161 tons in 1962, 223,142 tons in 1963, 252,785 tons in 1964, and 242,833 tons in 1965.

Table 71.—Bituminous coal exported from the United States, by customs districts

(Net tons)

Customs district	1962	1963	1964	1965
North Atlantic:				
Maine and New Hampshire	3,224	1,934	810	726
Massachusetts	187	---	---	15,659
New York	23,300	2,645	155	6,355
Philadelphia	41,048	215,845	68,382	32,229
Rhode Island	---	---	2,617	---
South Atlantic:				
Maryland	2,119,628	3,477,457	3,257,925	2,791,262
Virginia	24,883,469	29,675,818	30,531,995	31,933,465
Gulf Coast:				
Galveston	316	1,455	3,879	17,340
Mobile	---	127	484	321
New Orleans	1,151	12,304	767	4,867
Mexican border:				
Arizona	61	56	---	207
El Paso	49,022	36,303	48,636	49,079
Laredo	1,841	3,215	4,406	10,168
Pacific Coast:				
Los Angeles	---	---	1,260	30
San Diego	---	---	---	101
San Francisco	30	236	---	96
Washington	1,186	---	500	400
Northern border:				
Buffalo	150,701	160,215	126,300	83,240
Chicago	10,821	41,056	16,388	53,672
Dakota	7,721	7,101	3,997	1,272
Duluth and Superior	22,482	2,510	5,100	7,123
Indiana	4,777	---	---	---
Michigan	259,223	184,224	135,102	117,380
Minnesota	---	212	---	---
Montana and Idaho	2,282	2,095	2,310	1,309
Ohio	9,096,160	10,338,842	11,941,491	13,106,688
Rochester	1,493,491	2,758,490	1,607,481	1,672,630
St. Lawrence	240,901	148,613	209,438	257,244
Vermont	235	7,462	---	18,498
Miscellaneous:				
Alaska	84	---	---	---
Kentucky	30	---	---	---
Connecticut	---	220	---	---
Total	38,413,371	47,078,435	47,969,423	50,181,361

Table 72.—Shipments of bituminous coal to possessions and other areas administered by the United States

(Net tons)

Territory	1963	1964	1965
Guam	12	89	---
Puerto Rico	1,979	1,710	1,044
Virgin Islands	18	5	64

WORLD PRODUCTION

Coal production throughout the world increased 1.7 percent during 1965, as compared to an increase of 4 percent during 1964. The lower rate of increase resulted in part from the competition of oil and natural gas in world markets heretofore served by coal. The principal increases were in the United States and the U.S.S.R. Of the total, the United States supplied 527 million tons of bituminous coal, anthracite, and lignite, or 17 percent of world output, of which 50 million tons were exported, principally to Canada, Europe, and Janpan.

Table 73.—World production of bituminous coal, anthracite, and lignite by countries

(Thousand short tons)

Country	1961	1962	1963	1964	1965 [p]
North America:					
Canada:					
Bituminous	8,189	8,028	8,702	9,325	9,525
Lignite	2,209	2,256	1,874	1,994	2,064
Greenland: Bituminous	35	29	44	26	22
Mexico: Bituminous	2,004	2,087	2,283	[r] 2,345	2,211
United States:					
Anthracite (Pennsylvania)	17,446	16,894	18,267	17,184	14,866
Bituminous	399,959	419,094	456,223	484,048	509,045
Lignite	3,018	3,055	2,705	2,950	3,043
Total	432,860	451,443	490,098	[r] 517,872	540,776
South America:					
Argentina: Bituminous	[r] 369	315	[r] 276	[r] 465	[e] 465
Brazil: Bituminous (including lignite)	2,635	2,765	2,834	3,578	3,729
Chile: Bituminous (mined)	1,944	2,045	1,895	1,972	1,904
Colombia: Bituminous	3,086	3,307	3,527	3,307	3,417
Peru: Bituminous and anthracite	184	180	144	161	99
Venezuela: Bituminous	34	30	46	42	34
Total	[r] 8,252	8,642	[r] 8,722	[r] 9,525	9,648
Europe:					
Albania: Lignite	319	[r] 332	[r] 278	[r] 322	[e] 386
Austria:					
Bituminous	117	109	115	114	65
Lignite	6,240	6,296	6,672	6,350	6,008
Belgium: Bituminous and anthracite	23,739	23,398	23,609	23,485	21,810
Bulgaria:					
Bituminous and anthracite	651	701	725	670	608
Lignite	19,890	22,669	22,349	26,147	28,285
Czechoslovakia:					
Bituminous	28,917	29,927	31,191	[r] 31,211	30,581
Lignite	71,984	76,594	80,803	83,340	79,729
Denmark: Lignite	[r] 2,749	[r] 2,818	[r] 2,769	[e] 2,094	1,543
France:					
Bituminous and anthracite	57,715	57,728	52,649	[r] 58,469	56,601
Lignite	3,203	3,177	2,724	[r] 2,474	2,964
Germany:					
Bituminous and anthracite:					
East	2,944	2,838	2,737	[r] 2,579	2,535
West	158,309	156,417	156,656	156,750	148,897
Lignite:					
East	261,166	272,262	[r] 280,228	[r] 283,212	276,790
West	107,140	111,610	[r] 117,572	[r] 122,294	112,332
Pech coal: West	1,943	[r] 1,940	2,029	2,060	1,913
Greece: Lignite	2,760	2,971	[r] 3,876	[r] 4,191	5,512
Hungary:					
Bituminous	3,385	3,685	[r] 4,090	4,547	4,808
Lignite	27,672	27,901	[r] 29,508	30,229	29,845
Ireland: Bituminous and anthracite	222	229	[r] 257	255	204
Italy:					
Bituminous and anthracite	818	763	645	520	429
Lignite	1,681	1,958	1,506	[r] 1,325	1,123
Netherlands: Bituminous and anthracite	13,912	12,757	12,686	12,655	12,617
Poland:					
Bituminous	117,513	120,818	124,726	129,360	130,989
Lignite	11,396	12,226	16,914	22,355	24,941
Portugal:					
Anthracite	518	446	459	489	472
Lignite	174	169	157	[r] 111	99
Rumania:					
Bituminous and anthracite [1]	5,404	5,863	6,234	[r] 6,495	6,654
Lignite	4,190	4,707	5,084	[r] 5,766	6,679
Spain:					
Bituminous and anthracite	15,207	13,994	14,229	[r] 13,444	14,200
Lignite	2,303	2,743	2,856	[r] 2,870	3,064
Svalbard (Spitzbergen): Bituminous:					
Controlled by Norway	407	[r] 521	[r] 421	[r] 487	478
Controlled by U.S.S.R.	439	405	408	[e] 661	[e] 661
Sweden: Bituminous	220	163	[r] 109	[r] 94	64
U.S.S.R.: [2]					
Bituminous and anthracite	415,592	[r] 425,968	[r] 435,558	[r] 450,701	473,993
Lignite	147,176	[r] 144,376	150,565	[r] 159,975	165,347

See footnote at end of table.

Table 73.—World production of bituminous coal, anthracite, and lignite by countries—Continued

Country	1961	1962	1963	1964	1965 p
United Kingdom: Bituminous and anthracite	r 213,321	r 221,130	219,291	216,863	209,999
Yugoslavia:					
Bituminous	1,447	1,310	1,418	r 1,391	1,289
Lignite	25,089	25,910	28,810	31,139	31,733
Total [2]	r 1,757,872	r 1,799,829	r 1,842,913	r 1,897,494	1,896,247
Africa:					
Algeria: Bituminous and anthracite	86	58	r 42	r 51	50
Congo, Republic of the (Kinshasa, formerly Leopoldville): Bituminous	80	84	101	110	126
Malagasy Republic: Bituminous	2	---	2	r 4	2
Morocco: Anthracite	452	408	445	441	462
Mozambique: Bituminous	354	328	312	270	262
Nigeria: Bituminous	669	699	636	r 771	816
Rhodesia, Southern: Bituminous	3,387	3,115	3,020	3,355	e 4,200
South Africa, Republic of: Bituminous and anthracite (marketable)	43,613	45,498	46,798	49,513	53,418
Swaziland: Anthracite and bituminous	1	---	---	r 4	33
Tanzania: Bituminous	2	3	2	1	2
United Arab Republic (Egypt): Bituminous	---	---	---	---	22
Total	48,646	50,193	r 51,358	r 54,520	59,393
Asia:					
Afghanistan: Bituminous [3]	76	r 123	108	125	161
Burma: Bituminous	2	3	r 3	r 11	e 11
China: Bituminous, anthracite, and lignite	275,000	275,000	300,000	320,000	330,000
India:					
Bituminous	61,801	67,649	r 72,704	r 70,538	74,032
Lignite	71	233	r 1,101	r 1,730	2,535
Indonesia: Bituminous	r 605	r 520	651	r 492	430
Iran: Bituminous [3]	r 218	r 176	r 213	r 302	e 300
Japan:					
Bituminous and anthracite	60,058	59,965	r 57,377	r 56,140	54,602
Lignite	1,443	1,225	1,007	r 762	632
Korea:					
North: Anthracite, bituminous, and lignite	12,996	14,550	r 15,476	r 17,086	21,164
South: Anthracite	6,486	8,206	9,765	r 10,606	11,296
Mongolia, Outer: Lignite and bituminous	826	948	931	e 780	1,091
Pakistan: Bituminous and lignite	1,015	1,097	1,370	1,338	1,355
Philippines: Bituminous	168	180	173	127	101
Taiwan: Bituminous	r 4,764	5,020	r 5,302	r 5,542	5,571
Thailand: Lignite	119	149	151	r 115	138
Turkey (mined):					
Bituminous	7,035	7,156	r 7,496	r 7,872	7,724
Lignite	4,159	4,668	5,502	r 6,369	6,929
Viet-Nam:					
North: Anthracite	r 3,118	3,823	3,714	e 4,000	e 3,900
South: Anthracite	63	78	115	r 85	e 83
Total [2]	r 440,023	r 450,769	r 483,159	r 504,020	522,055
Oceania:					
Australia:					
Bituminous	26,886	27,406	r 27,840	r 30,691	35,173
Lignite	18,232	r 19,193	r 20,672	r 21,318	23,197
New Zealand:					
Bituminous and anthracite	3,101	2,690	r 2,890	r 3,047	2,801
Lignite	175	166	181	175	176
Total	48,394	r 49,455	r 51,583	r 55,231	61,347
Lignite (total of items shown above) (estimate)	r 725,384	r 750,612	r 786,795	r 820,387	816,185
Bituminous and anthracite (by subtraction)	r 2,010,663	r 2,059,719	r 1,141,038	r 2,218,275	2,273,281
World total, all grades (estimate)	r 2,736,047	r 2,810,331	r 2,927,833	r 3,038,662	3,089,466

e Estimate. p Preliminary. r Revised.

[1] Includes a preponderant share of low-grade bituminous.
[2] Output from U.S.S.R. in Asia (including Sakhalin) included with U.S.S.R. in Europe.
[3] Year ended March 20 of year following that stated.

ECONOMIC AND TECHNICAL DEVELOPMENTS

During 1965, developments affecting the coal industry were dichotomous in nature. Although production increased for the fourth consecutive year, environmental problems and advancement of nuclear energy posed new problems for coal. The demand for coal was strong. Electric utilities increased their coal consumption for the seventh consecutive year and there were increases in coal exports and in the consumption of coal at coke plants. For the second consecutive year coal made substantial gains in new market areas. The first coal-fired electric generating unit was announced for a plant in Mississippi; and substantial tonnages of coal will be consumed by electric plants announced for construction in the Four Corners area of New Mexico. Among other places, the power generated at these western plants will be transmitted to California, a non-coal-consuming state.

Among the new developments in underground mining was the installation of a second mobile bridge conveyor. This revolutionary haulage system was first introduced in 1964. The second went into operation in a West Virginia mine and, as a result, productivity from a continuous miner increased substantially. Also, with this new conveyor unit coal coming from a continuous miner is moved directly to the main haulage system without the use of shuttle cars. A new carbide-tipped, conical bit was introduced for underground mining machinery which will markedly reduce bit costs. Advantages claimed for the new bit are as follows: fewer bits are required, larger sized coal is produced with less dust and fines, and the bits tend to be self-sharpening because of a rotating action. In roof bolting two developments were announced which may take hold. The first, was the ball and socket type roof bolt head and plate which makes it easier to install roof bolts at an angle and still retain the proper tension between the bolt head and plate. The second development was the resin anchored roof bolt which considerably reduces roof sag, especially at intersections. The use of resin appears especially promising in mines where roof conditions are bad. A leading equipment manufacturer announced that an underground push-button miner would be a reality within a few years. This mining system, if adopted, could materially reduce mining costs with substantially increased productivity rates. For the second consecutive year, high interest was shown in long walling. A total of 12 installations were reported, although two operations were temporarily closed for equipment modifications. Activity in longwall mining appears still to be in the developmental stage; that is, emphasis was centered on developing new equipment and techniques which may establish a pattern for future operations.

In surface mining, as in the past several years, the emphasis was on larger earthmoving equipment. A 180-cubic-yard shovel went into operation in southern Illinois and a 3,500-horsepower wheel excavator started uncovering lignite in North Dakota. The excavating wheel is the largest in the lignite fields of the United States. For the first time in several years, there were no announcements received of stripping shovels under contract that would shatter existing records. In addition to the large earthmoving equipment, economies in surface mining were achieved by less spectacular methods. Not only did some mines employ larger drillholes, up to 15 inches in diameter, but two new explosives were introduced which could lead to wider spacing of drillholes. A new metalized slurry used to prime AN-FO blasting agents was made available commercially which is reported to lower burden preparation costs by as much as 10 percent. Another new explosive which improves blasting results is the nitro-carbo-nitrate slurry packaged in polyethylene cartridges.

A tremendous expansion in truck haulage capacity resulted when a 240-ton coal-hauling truck went into service. The truck is powered by two 1,000-horsepower diesel engines mounted on each end of the truck. Each engine drives a generator which powers two electric motors mounted on each of the outermost axles. The unit is 96 feet long, 15 feet wide, and almost 16 feet in height. The truck is equipped with dual wheels and rolls on 16 tires. It is possible to operate the 240-ton coal hauler from either one of the cabs mounted on each end.

A growing interest in surface mine reclamation was expressed by the Nation, by industry, by State governments, and by the Federal Government during 1965. Several State legislatures passed more stringent surface mine reclamation bills. Many organizations have expressed concern about reclamation and urged that steps be taken to preserve our natural beauty. For the first time, the Tennessee Valley Authority asked for bids on coal that would include costs of restoring land laid open by surface mining. In response to these increased interests, reclaiming mined land to serve useful purposes received greater attention of industry leaders. Development of recreational facilities on mined land was chief among the uses, including the development of lakes for fishing, boating, and camping.

Chief developments in coal preparation were the introduction of better designed equipment. A new high in the capacity of single washers was achieved, and the first tandem washing table was introduced which reduces floor space by 50 percent. Increased numbers of dewatering screens, thickeners, cyclones, centrifuges, and filters were installed.

There was an increased use of ground storage facilities for unit train loading. There also was increased use of silo and bin storage facilities. The newly developed slip form construction technique was used in several instances. Bin diameters of 70 to 80 feet were achieved. The increase of ground storage facilities was accompanied by renewed interest in stocking and reclaiming equipment and improved techniques for lowering the attendant costs. In one instance a tunnel was provided so that a unit train could be loaded under the stockpile.

Revolutionary methods of coal transportation, a trend that started developing in 1962, made further advances. The transportation of coal by unit train rose significantly to well over 100 million tons. Several major railroads began building or ordered new hopper cars mainly for unit train haulage. Most of these cars were in the 100-ton class; however, one company designed and built a 240-ton-capacity all-aluminum car. Water transportation facilities also witnessed significant gains. A 4,320-horsepower diesel-powered towboat was launched on the Ohio River for express tows between the Pittsburgh area and points on the Ohio-Mississippi and Gulf Intercoastal Waterway Systems. A second oceangoing tug and barge unit was put into service by a Florida power-generating company. Both tugs and barges are identical and are claimed to be the largest dry cargo ocean carriers afloat. Ocean transportation continued to follow reforms. The amount of coal transported by a supercollier hit an all-time high. The Sigtina, a Norwegian supercollier, broke the coal loading record by taking on 70,653 tons at Norfolk, Va. The shipment was bound for Holland and the vessel maintained a schedule of discharging in three days, loading in two, and making the round trip voyage in 23 days. Late in 1964, France announced she would construct a large supercollier capable of hauling more than 80,000 tons of coal. Since that time at least six of these huge supercolliers are reported to be on the drawing boards of coal-importing countries. Complementing and conducive to this trend, Congress passed and the President signed a bill to have the channel at Hampton Roads deepened from its present depth of 40 feet to 45 feet. The net result of changing technology development in both overland and ocean transportation was that the cost of moving coal from mine to market was considerably reduced in many instances.

Coal's biggest customer is the electric utilities. By late 1965, it was reported that 62 new coal-fired generating units were under construction or would come on line by 1971. These units when completed are expected to consume some 90 million tons of coal each year. Nearly half of the capacity of these new units will be mine-mouth generating units and one-third will obtain coal via unit trains. One noteworthy development in coal utilization was made when a Florida company decided on a $3.8 million coal-fired, water desalting plant with a capacity of 2.62 million gallons per day to serve Key West and adjacent islands.

During 1965, legislative action at various levels of government resulted in laws which will significantly affect the coal industry. Probably the most important single piece of legislation was the Appalachian Redevelopment Act, which was designed to assist the economic development of the Appalachian States. One section of this act deals with mining restoration and authorizes the Secretary of the Interior to make financial contributions to states rehabilitating areas damaged by deleterious mining practices, particularly at abandoned mines. The Federal Government may provide up to 75 percent of the cost involved. The act also provides for the Secretary of the Interior to conduct a study of strip and surface mining and submit a report with recommendations to the President. The public concern for air pollution is evidenced by the more than 275 items of air pollution control legislation introduced in 37 states. Of this total, 33 items were passed in 15 States. Efforts also were made to establish effective means for controlling stream pollution. A comprehensive study of acid mine drainage problems was started in Pennsylvania by scientists of the Department of the Interior's Geological Survey, Bureau of Mines, and Bureau of Sport Fisheries and Wildlife, and of the Commonwealth of Pennsylvania. The project is aimed at determining the most effective and least costly method of preventing and controlling water pollution caused by acid mine waters. One large manufacturing and research company is developing a process to convert acid drainage from mines to potable water. Electricity will be produced at the same time and coal will be used as a fuel. It is estimated that a 5-million-gallon-per-day plant can make potable water for 33.3 cents per 1,000 gallons.

Coal research programs were intensified by the coal industry as well as by Federal and State governments. Carbon black equal in quality to that produced commercially has been made from coal in laboratory tests. A series of full-scale boiler tests showed that ash fouling was associated with a high sodium content in lignite used as a fuel at a large electric utility. Char and coke breeze made from Western coals proved as good as low and medium volatile coals when used in coking blends. Adoption of this blending technique could make Western coke producers less dependent on lower volatile Eastern coals. A process of using coal for treating sewage was successfully demonstrated. In this process, coal removes solids, phosphates and hard detergents to a greater extent than do conventional activated sludge processes. The application of computer simulation techniques at a large coal mine is credited with increasing the productivity by 25 percent. Fluidized combustion of coal was achieved for the first time in a boiler furnace. Successful development of this combustion technique could reduce the cost of coal-fired equipment and minimize air pollution. During 1965 many Federal, State, and industrial coal research organizations placed increasing emphasis on research projects related to the dual problems of air and stream pollution.

Coal—Pennsylvania Anthracite

By J. A. Vaughan[1] and Marian I. Cooke[2]

CONTENTS

GENERAL SUMMARY

Production of Pennsylvania anthracite totaled 14.9 million short, or net, tons in 1965, a decrease of 14 percent from that of 1964. Of this total, 35 percent was produced at underground mines, 40 percent at strip pits, 20 percent from culm and silt banks, and 5 percent from river dredging. When compared with tonnages produced in 1964, underground production declined 10 percent, that from strip pits 17 percent, and that from culm banks 14 percent. Output from dredging operations remained about the same—decreasing less than 1 percent.

Total value of the 1965 output was $122.0 million, 18 percent less than in 1964. Production of pea and larger sizes declined 18 percent from that of 1964 and the buckwheat No. 1 and smaller category, 11 percent. Although the pea and larger sizes amounted to only 37 percent of the year's output (39 percent in 1964), they accounted for 52 percent of the industry's total revenue because of the higher prices received for these sizes. The average value for the pea and larger group of sizes was $11.70 per net ton f.o.b. preparation plant, a loss of $0.68 or 5 percent, while the average for the buckwheats was $6.24, a loss of $0.10 per ton, or 2 percent. As a result, the average value for all sizes decreased to $8.27—$0.43 less than in 1964.

Apparent consumption of anthracite in the United States during 1965 was estimated at 12.9 million tons, a loss of 10 percent. Although use data are incomplete for anthracite, the decrease in apparent consumption indicated a decreased demand for all sizes.

Exports of anthracite totaled 900,000 tons, a decrease of 46 percent from the 1.6 million tons shipped to foreign countries in 1964. The decrease was attributable to the trade with Western Europe, which dropped 84 percent. However, a more accurate measurement of the importance of exports to the industry can be obtained by adding the quantity shipped for use by the U.S. Armed Forces in West Germany to the tonnage reported by the Bureau of the Census. This computation indicates that approximately 1,981,000 tons were actually exported, or about 13 percent of the total 1965 production.

With the decline in production of 13 percent the average number of men working daily at anthracite operations in 1965 also fell (15 percent) to a total of 11,132. As the reduced force worked 204 days, 10 less than in 1964, the total number of man-days worked declined to 2.3 million, or 19 percent less than in 1964. The pro-

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[2] Supervisory statistical officer.

ductivity rate again established a new record, 6.55 tons per man-day as compared with 6.11 in 1964.

The overall injury rate in the industry decreased to 65.65 per million man-hours, compared with 67.07 in 1964. A total of 8 men lost their lives at anthracite operations (24 in 1964), at a frequency rate of 0.49 per million man-hours (1.18 in 1964). Nonfatal injuries totaled 1,067 during the year compared with 1,342 in 1964; the rate decreased from 65.89 in 1964 to 65.16 in 1965.

Table 1 includes salient annual statistics for 1961–65; selected historical data for 1930–65 are shown in table 2. Table 3 shows monthly developments in the industry in 1965.

Table 1.—Salient statistics of the Pennsylvania anthracite industry, 1961–65

	1961	1962	1963	1964	1965
Production:					
Preparation plants net tons	16,655,847	16,015,366	17,415,365	16,335,700	14,023,269
Dredges do	745,498	726,666	691,370	704,748	699,857
Used at collieries for power and heat net tons	45,094	151,614	160,649	143,803	142,829
Total production do	17,446,439	16,893,646	18,267,384	17,184,251	14,865,955
Value of production	$140,337,541	$134,093,874	$153,503,442	$148,647,575	$122,021,267
Average sales realization per net ton on preparation plant shipments (excludes dredge coal):					
Pea and larger	$10.80	$10.90	$11.65	$12.38	$11.70
Buckwheat No. 1 and smaller	$6.32	$6.14	$6.43	$6.56	$6.48
All sizes	$8.26	$7.99	$8.64	$8.93	$8.51
Percentage of total preparation plant shipments (excludes dredge coal):					
Pea and larger	43.4	43.1	42.4	40.8	39.0
Buckwheat No. 1 and smaller	56.6	56.9	57.6	59.2	61.0
Producers' stocks at end of year [1] net tons	232,520	(2)	(2)	(2)	(2)
Exports [3] do	1,435,335	1,801,724	3,357,340	1,575,097	850,630
Imports [3] do	792	7,583	[4] 4,625	NA	NA
Consumption (apparent) do	15,900,000	14,300,000	14,100,000	14,400,000	12,900,000
Average number of days worked	196	204	216	214	204
Average number of men working daily	15,792	14,010	13,498	13,144	11,132
Output per man per day net tons	5.63	5.92	6.27	6.11	6.55
Output per man per year do	1,103	1,208	1,354	1,308	1,336
Quantity cut by machines do	236,166	277,537	240,427	417,080	329,328
Quantity mined by stripping do	7,246,646	6,822,207	7,467,842	7,177,188	5,938,982
Quantity loaded by machines underground net tons	3,377,778	3,065,364	3,665,962	3,455,034	3,246,034
Distribution:					
Receipts in New England [5] do	634,435	495,390	422,012	331,780	241,638
Exports to Canada [3] do	965,576	892,488	794,585	636,867	642,657
Loaded into vessels at Lake Erie [6] net tons	221,435	196,440	191,609	216,590	224,460
Receipts at Duluth-Superior [7] do	33,474	26,516	32,615	47,649	23,597

NA Not available.
[1] Anthracite Committee.
[2] This series discontinued.
[3] U.S. Department of Commerce, 1961–65 export data does not include shipments to U.S. military forces. See NOTE, tables 3 and 34.
[4] Import data discontinued with August 1963.
[5] Commonwealth of Massachusetts, Division on the Necessaries of Life.
[6] Ore and Coal Exchange, Cleveland, Ohio.
[7] Lake Superior Area Office, Corps of Engineers, U.S. Army, Duluth, Minn.

Table 2.—Trends in the Pennsylvania anthracite industry

	Production (net tons)	Value of production	Average value per net ton	Exports [1] (net tons)	Imports [1] (net tons)	Apparent consumption [2] (net tons)	Average number of employees	Average number of days worked	Average tons per man per day	Average tons per man per year	Quantity cut by machines (net tons)	Quantity produced by stripping (net tons)	Quantity loaded mechanically underground (net tons)
1930	69,384,837	$354,574,191	$5.11	2,551,659	674,812	67,628,000	150,804	208	2.21	460	1,410,123	2,536,288	4,467,750
1931	59,645,652	296,354,586	4.97	1,778,308	637,951	58,408,000	139,431	181	2.37	428	1,587,265	3,813,237	4,384,780
1932	49,855,221	222,375,129	4.46	1,303,355	607,097	50,500,000	121,243	162	2.54	411	1,674,223	3,980,973	5,433,340
1933	49,541,344	206,718,405	4.17	1,034,562	456,252	49,600,000	104,633	182	2.60	473	1,648,249	4,932,069	6,557,267
1934	57,168,291	244,152,245	4.27	1,297,610	478,118	55,500,000	109,050	207	2.53	524	1,981,088	5,798,138	9,284,486
1935	52,158,783	210,130,565	4.03	1,608,549	571,439	51,100,000	103,269	189	2.68	505	1,848,095	5,187,072	9,279,057
1936	54,579,535	227,003,538	4.16	1,678,024	614,639	53,200,000	102,081	192	2.79	535	2,162,744	6,203,267	10,827,946
1937	51,856,433	197,598,849	3.81	1,914,173	395,737	50,400,000	99,085	189	2.77	523	1,984,512	5,696,018	10,683,837
1938	46,099,027	180,600,167	3.92	1,908,911	362,895	45,200,000	96,417	171	2.79	478	1,588,407	5,095,341	10,151,669
1939	51,487,377	187,175,324	3.64	2,590,000	298,153	49,700,000	93,138	183	3.02	553	1,881,884	5,486,479	11,773,833
1940	51,484,640	205,489,814	3.99	2,667,632	135,436	49,000,000	91,313	186	3.02	562	1,816,483	6,352,700	12,326,000
1941	[3] 56,368,267	240,275,126	4.26	3,380,189	74,669	52,700,000	88,054	203	[4] 3.04	[4] 617	1,855,422	7,316,574	13,441,987
1942	[3] 60,327,729	271,673,880	4.50	4,438,588	140,115	56,500,000	82,121	239	[4] 2.95	[4] 705	2,285,640	9,070,933	14,741,459
1943	[3] 60,643,620	306,816,018	5.06	4,138,680	166,020	57,100,000	79,153	270	[4] 2.78	[4] 751	1,624,883	8,989,387	14,745,793
1944	[3] 63,701,363	354,582,884	5.57	4,185,933	11,847	59,400,000	77,591	292	[4] 2.79	[4] 815	1,336,082	10,953,030	14,975,146
1945	[3] 54,933,909	323,944,435	5.90	3,691,247	149	51,600,000	72,842	269	[4] 2.79	[4] 751	1,210,171	10,056,325	13,927,955
1946	[3] 60,506,873	413,417,070	6.83	6,497,245	9,556	53,900,000	78,145	271	[4] 2.84	[4] 770	1,232,828	12,858,930	15,619,162
1947	[3] 57,190,009	413,019,486	7.22	8,509,995	10,350	48,200,000	78,600	259	[4] 2.78	[4] 720	1,209,983	12,603,545	16,054,011
1948	[3] 57,139,948	467,051,800	8.17	6,675,914	945	50,200,000	76,215	265	[4] 2.81	[4] 745	1,016,757	13,352,874	15,742,368
1949	[3] 42,701,724	358,008,451	8.38	4,942,670	------	37,700,000	75,377	195	[4] 2.87	[4] 560	557,599	10,376,808	11,858,088
1950	[3] 44,076,703	392,398,006	8.90	3,891,569	18,289	39,900,000	72,624	211	[4] 2.83	[4] 597	611,734	11,833,934	12,335,650
1951 [5]	42,669,997	405,817,963	9.51	5,955,535	26,812	37,000,000	68,995	208	2.97	618	496,085	11,135,990	10,847,787
1952	40,582,558	379,714,076	9.36	4,592,060	29,370	35,300,000	65,923	201	3.06	615	386,128	10,696,705	10,034,464
1953	30,949,152	299,139,687	9.67	2,724,270	31,443	28,000,000	57,862	163	3.28	535	318,699	8,606,482	6,838,769
1954	29,083,477	247,870,023	8.52	2,851,239	5,831	26,900,000	43,996	164	4.02	659	381,424	7,939,680	6,978,035
1955	26,204,554	206,096,662	7.86	3,152,313	170	23,600,000	[e] 33,523	[e] 197	[e] 3.96	[e] 780	393,932	7,703,907	6,660,939
1956	28,900,220	236,785,062	8.19	5,244,349	46	24,000,000	31,516	216	4.25	918	400,402	8,354,230	7,308,110
1957	25,338,321	227,753,802	8.99	4,331,785	1,138	20,800,000	30,825	196	4.18	819	292,307	7,543,157	6,657,479
1958	21,171,142	187,898,316	8.88	2,279,859	4,363	19,000,000	26,540	183	4.36	798	184,028	6,877,761	5,332,043
1959	20,649,286	172,319,913	8.35	1,787,558	2,633	18,800,000	23,294	173	5.12	886	260,502	7,096,343	4,700,542
1960	18,817,441	147,116,250	7.82	1,440,400	1,476	17,600,000	19,051	176	5.60	986	225,520	7,112,288	4,044,392
1961	17,446,439	140,337,541	8.04	1,435,335	792	15,900,000	15,792	196	5.63	1,103	236,166	7,246,646	3,377,778
1962	16,893,646	134,093,874	7.94	1,801,724	7,583	14,300,000	14,010	204	5.92	1,208	277,537	6,822,207	3,065,364
1963	18,267,384	153,503,442	8.40	3,357,340	[6] 4,625	14,100,000	13,498	216	6.27	1,354	240,427	7,467,842	3,665,962
1964	17,184,251	148,647,575	8.65	1,575,097	NA	14,400,000	13,144	214	6.11	1,308	417,080	7,177,188	3,455,034
1965	14,865,955	122,021,267	8.21	850,630	NA	12,900,000	11,132	204	6.55	1,336	329,328	5,938,982	3,246,034

[e] Estimated. NA Not available.
[1] U.S. Department of Commerce. Export data for 1961–65 does not include shipments to U.S. military forces. See NOTE, tables 3 and 34.
[2] After 1961 the figures of consumption take no account of producers' stocks, there being no data available for this item.
[3] Includes some bootleg coal purchased by authorized operators and prepared at their breakers.
[4] Output per man calculated on authorized tonnages only; bootleg purchases excluded.
[5] Figures for 1951 and subsequent years are not strictly comparable with previous years. See Production and Employment sections, Coal—Pennsylvania Anthracite, Bureau of Mines Minerals Yearbook 1951.
[6] For period January–August. Beginning with September, anthracite import data is included with bituminous coal.

Table 3.—Statistical summary of monthly developments

(Net tons, except as

	January	February	March	April	May	June
Production (including mine fuel, local sales, and dredge coal)	1,215,000	1,006,000	1,256,000	1,127,000	1,264,000	1,565,000
Shipments (breakers and washeries only, all sizes):						
By rail [1]	496,147	391,326	563,440	522,053	666,850	762,105
By truck [2]	740,960	738,456	669,354	568,736	434,639	487,377
Carloadings [3]	8,734	7,241	10,913	10,445	11,855	14,696
Distribution:						
Lake Erie loadings [4]	--------	--------	--------	13,198	34,038	19,539
Lake Ontario loadings [4]	--------	--------	--------	--------	--------	--------
Receipts at Duluth-Superior [5]	--------	--------	--------	--------	4,997	--------
Upper Lake dock trade: [6]						
Receipts:						
Lake Superior	--------	--------	--------	--------	--------	--------
Lake Michigan	657	680	656	1,428	7,598	315
Deliveries (reloadings):						
Lake Superior	751	453	13	66	1	3
Lake Michigan	1,387	1,300	1,091	513	587	910
New England receipts:						
By Rail [7]	13,257	13,416	11,973	13,064	23,848	35,118
Exports [8]	32,116	22,542	42,472	45,037	73,143	93,126
Industrial consumption and stocks by:						
Electric utilities: [9]						
Consumption	175,035	166,074	182,064	162,808	176,520	183,795
Stocks	1,173,933	1,121,548	1,107,248	1,133,489	1,127,705	1,133,577
Coke plants:						
Used for carbonizing	40,544	36,797	46,408	43,264	42,078	39,925
Stocks	103,820	82,080	69,019	59,026	68,435	86,581
Stocks on Upper Lake Docks: [6]						
Lake Superior	574	121	108	42	41	38
Lake Michigan	5,303	4,683	4,248	4,358	11,369	10,774
Stocks in retail dealer yards: [10]						
Chestnut and larger	251,000	195,000	158,000	172,000	257,000	316,000
Pea	36,000	30,000	30,000	27,000	33,000	38,000
Buckwheat No. 1 and rice	200,000	150,000	116,000	115,000	151,000	179,000
Total	487,000	375,000	304,000	314,000	441,000	533,000
Retail dealer deliveries: [10]						
Chestnut and larger	243,000	221,000	173,000	96,000	54,000	82,000
Pea	49,000	50,000	42,000	30,000	14,000	24,000
Buckwheat No. 1 and rice	102,000	99,000	86,000	62,000	43,000	97,000
Total	394,000	370,000	301,000	188,000	111,000	203,000
Wholesale price indexes (1957–59=100): F.o.b. mines: [11]						
Chestnut	100.6	100.6	100.6	83.6	83.6	83.6
Pea	101.8	101.8	101.8	85.0	85.0	85.0
Buckwheat No. 1	97.6	97.6	97.6	86.4	86.4	86.4
Buckwheat No. 3	109.4	109.4	109.4	109.4	109.4	109.4

[1] Furnished by the initial carriers.

[2] Pennsylvania Department of Mines and Mineral Industries.

[3] Association of American Railroads.

[4] Ore and Coal Exchange, Cleveland, Ohio.

[5] 1964 data furnished by Lake Superior Area Office, Corps of Engineers, U.S. Army, Duluth, Minn. 1965 data obtained from Skillings' Mining Review.

[6] Data courteously supplied by Upper Lake Docks Coal Bureau, Inc., and direct reports to the Bureau of Mines.

[7] Commonwealth of Massachusetts, Division on the Necessaries of Life.

in the Pennsylvania anthracite industry in 1965

otherwise indicated)

July	August	September	October	November	December	Year 1965	Change from 1964 (percent)	Year 1964
1,209,000	1,244,000	1,313,000	1,221,000	1,208,000	1,238,000	14,866,000	—13.5	17,184,000
642,165	622,586	682,767	655,728	565,086	578,872	7,149,125	—16.1	8,524,753
444,814	425,271	482,637	524,231	592,114	703,018	6,811,607	—13.4	7,861,857
12,449	12,456	13,058	12,038	11,759	11,260	136,904	—17.5	166,021
27,593	27,669	5,743	67,323	19,531	9,826	224,460	+3.6	216,590
--------	906	--------	--------	--------	--------	906	—82.4	5,149
6,780	--------	--------	11,820	--------	--------	23,597	—50.5	47,649
--------	--------	--------	--------	--------	--------	---------	-----	24,596
521	975	1,350	793	480	374	15,827	+20.9	13,091
9	18	6	5	--------	--------	1,325	—95.5	29,700
1,013	1,388	1,075	1,638	1,280	1,152	13,334	—7.1	14,359
24,729	19,822	21,836	22,957	24,105	17,513	241,638	—27.2	331,780
82,494	88,230	129,100	108,252	68,558	65,560	850,630	—46.0	1,575,097
183,569	202,951	178,103	180,639	177,959	188,690	2,158,207	—3.6	2,239,319
1,147,710	1,159,834	1,154,828	1,186,542	1,158,745	1,087,682	1,087,682	—12.8	1,247,238
36,055	41,379	41,282	46,368	46,224	46,883	507,207	+3.0	492,318
95,502	96,629	104,889	113,935	125,057	133,999	133,999	+3.6	129,342
29	11	5	--------	--------	--------	---------	-----	1,132
10,259	9,846	10,121	9,276	8,476	7,698	7,698	+27.6	6,033
312,000	312,000	308,000	296,000	288,000	267,000	267,000	—12.7	306,000
39,000	37,000	42,000	39,000	38,000	34,000	34,000	—8.1	37,000
206,000	208,000	223,000	220,000	226,000	204,000	204,000	—16.0	243,000
557,000	557,000	573,000	555,000	552,000	505,000	505,000	—13.8	586,000
95,000	106,000	134,000	208,000	191,000	226,000	1,829,000	—1.3	1,854,000
17,000	15,000	20,000	29,000	32,000	52,000	374,000	—11.2	421,000
99,000	102,000	43,000	46,000	60,000	84,000	923,000	—12.8	1,059,000
211,000	223,000	197,000	283,000	283,000	362,000	3,126,000	—6.2	3,334,000
87.0	87.0	87.0	90.4	90.4	90.4	90.4	—6.6	96.8
88.0	88.0	88.0	89.8	89.8	89.8	91.2	—6.8	97.9
88.4	88.4	88.4	90.7	90.7	90.7	90.8	—4.2	94.8
109.4	109.4	109.4	109.4	109.4	109.4	109.4	+1.6	107.7

[8] U.S. Department of Commerce. Does not include shipments to the U.S. military forces.

[9] Federal Power Commission.

[10] Estimated from reports submitted by a selected list of retail dealers located outside the producing region.

[11] Bureau of Labor Statistics. Based on data obtained from authorized trade publications.

NOTE.—According to the Association of American Railroads, 1,246,261 net tons of anthracite was exported to Europe during 1965 compared wtih 2,005,763 tons for 1964. Of this total 1,133,409 tons was consigned to West Germany and the Netherlands, including exports to U.S. military forces. This compares with 1,362,189 tons for 1964.

SCOPE OF REPORT

Data in this chapter refer only to anthracite, or hard coal, produced in the northeastern part of the Commonwealth of Pennsylvania. Production of anthracite, or semianthracitic coals of Arkansas, Colorado, New Mexico, Virginia, and Washington is included with bituminous coal and lignite in the Bituminous Coal and Lignite chapter of the Bureau of Mines Minerals Yearbook. The anthracite producing region is divided geologically into four fields: Northern, Eastern Middle, Western Middle, and Southern. The area is also grouped by coal trade usage into three regions: The Wyoming, which is coextensive with the Northern field; the Lehigh, which includes the Eastern Middle field and that portion of the Southern lying east of Tamaqua; and the Schuylkill, which encompasses all of the Western Middle field and that part of the Southern field west of Tamaqua.

Bureau statistics on production, value, and transportation methods are compiled almost entirely from reports submitted voluntarily by operators of preparation plants and dredges. Estimates are prepared on unreported tonnage from data published by the Pennsylvania Department of Mines and Mineral Industries and other sources. Questionnaires are also sent to operators of underground mines not equipped with preparation facilities and to contractors engaged either in strip mining or in reclaiming culm and silt banks. From these reports information is obtained on run-of-mine production, names of plants to which the raw coal is shipped for preparation, types of mining equipment used, and the counties, fields, and regions in which the run-of-mine production originated. These reports are used also to eliminate duplicate reporting and to obtain the widest possible coverage.

Beginning with calendar year 1961, Bureau production data have been presented by carrier method (rail and truck), rather than as shipments to points inside (local sales) and outside the producing region. Also, since 1956, statistics on employment in the Pennsylvania anthracite industry have been compiled from the Bureau of Mines questionnaire, Mine Injuries and Employment—Pennsylvania Anthracite, to lessen the reporting burden of respondents. Bureau employment data include production, development, maintenance, supervisory, shop, and technical personnel, plus partners or firm members who perform duties directly related to coal production. Sales and office workers and others not connected with production are excluded.

Summarized distribution data appearing in table 28 are collected by the Bureau from producers, wholesalers, and dock operators by coal year (April 1 to March 31) rather than calendar year because the former conforms more closely to the actual heating season. The complete report presents detailed information on shipments by sizes and method of movement to selected markets in the United States and Canada. Copies may be obtained by writing to the Bureau of Mines, U.S. Department of the Interior, Washington, D.C., 20240, or to the Publications Distribution Section, 4800 Forbes Avenue, Pittsburgh, Pa. 15213.

ACKNOWLEDGMENTS

Because Bureau of Mines canvasses of the Pennsylvania anthracite industry are restricted to such subjects as production by sizes, carrier method, employment, f.o.b. preparation-plant value, injuries, mining equipment, distribution, sources of production, and retail-dealer stocks and deliveries, the authors have made free use of relevant data from numerous sources. Although care has been taken to acknowledge each individual source by footnote reference, the Bureau would like to express its thanks to the Pennsylvania Department of Mines and Mineral Industries, the Association of American Railroads, Commonwealth of Massachusetts, the Ore and Coal Exchange, and the Anthracite Institute for their continued cooperation. However, as it would have been patently impossible to prepare this chapter without cooperation from the industry, the Bureau also extends its sincere appreciation to hundreds of producers who voluntarily submitted annual reports on their operations.

PRODUCTION, MINING METHODS, AND EQUIPMENT

Production of Pennsylvania anthracite totaled 14.9 million short tons in 1965, a decrease of 2.3 million tons, or 14 percent, from that of 1964. All sources of production registered declines, ranging from less than 1 percent for dredging operations to 17 percent for coal mined by stripping. Underground production rose to 35 percent of total production, compared with 34 percent in 1964; strip pits accounted for 40 percent (42 percent in 1964); culm banks, 20 percent (the same as 1964); and river coal, 5 percent (4 percent in 1964).

Each of the three producing regions showed losses in 1965. In the Lehigh region, total production was 7 percent less than that of 1964, with decreases of 6 percent in production from strip pits and 11 percent from culm banks; however, production from underground operations increased 2 percent. The Schuylkill region decreased output 16 percent, with the loss from underground mining amounting to 17 percent and from stripping operations, 21 percent. The amount of coal recovered from culm banks and from river dredging declined 13 percent and less than 1 percent, respectively. The Wyoming region recorded losses in each category; underground, 2 percent; strip pits, 25 percent; and, recovery from culm and silt banks, 20 percent. The Schuylkill region contributed 49 percent of the total production, a decrease of 2 percentage points from 1964; the Wyoming region's production rose 1 point from 30 to 31 percent; and the output from the Lehigh increased from 19 to 20 percent. Each of the major producing counties showed production losses—output in Northumberland and Columbia counties each declining 26 percent; Lackawanna, 23 percent; and, Schuylkill and Luzerne counties, 10 percent. Data on production by individual sizes, and in percent of total, are presented in tables 4, 5, and 6. Data for counties, regions, fields and source of production are included in tables 7, 8, and 9. Figure 1 shows trends in anthracite shipments, by regions, for 1950–65.

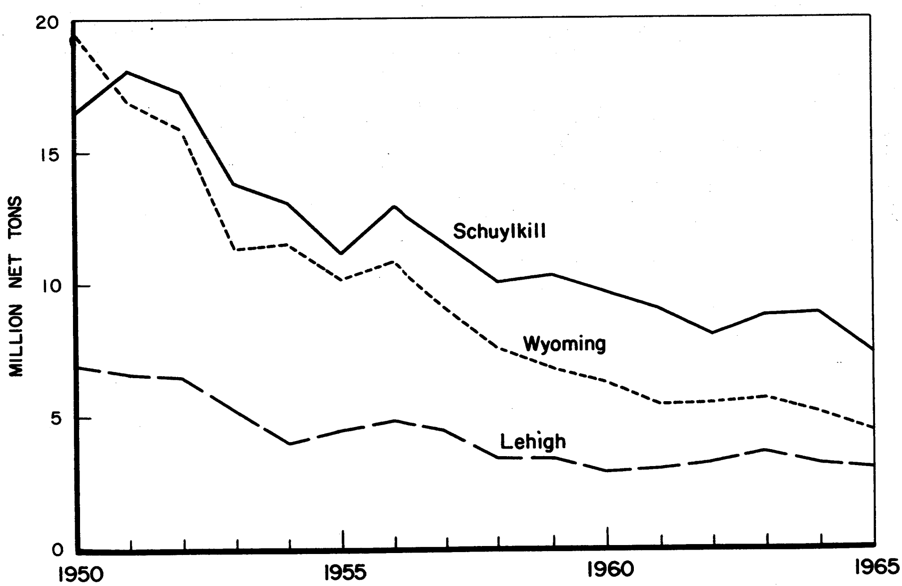

Figure 1.—Pennsylvania anthracite shipped from the Lehigh, Schuylkill, and Wyoming regions, 1950–65.

Table 4.—Commercial production of Pennsylvania anthracite in 1965, by regions and sizes

Size	From preparation plants								
	Lehigh region			Schuylkill region			Wyoming region [1]		
	Rail	Truck	Total	Rail	Truck	Total	Rail	Truck	Total
Net tons:									
Lump [2] and broken	----------	----------	----------	----------	----------	----------	1,006	60	1,066
Egg	108,030	6,657	114,687	58,888	4,366	63,254	203,354	3,725	207,079
Stove	269,866	79,407	349,273	286,392	397,856	684,248	520,842	141,512	662,354
Chestnut	226,994	213,795	440,789	240,189	558,657	798,846	378,395	357,441	735,836
Pea	100,503	177,879	278,382	188,746	370,185	558,931	171,963	398,013	569,976
Total pea and larger	705,393	477,738	1,183,131	774,215	1,331,064	2,105,279	1,275,560	900,751	2,176,311
Buckwheat No. 1	106,895	204,323	311,218	325,673	463,415	789,088	213,572	398,212	611,784
Buckwheat No. 2 (rice)	50,330	231,225	281,555	223,727	447,930	671,657	120,715	289,202	409,917
Buckwheat No. 3 (barley)	116,476	185,311	301,787	320,402	575,086	895,488	309,460	162,441	471,901
Buckwheat No. 4	109,121	54,320	163,441	262,856	168,480	431,336	92,337	75,064	167,401
Buckwheat No. 5	353,060	14,928	367,988	664,649	312,872	977,521	85,594	41,724	127,318
Other [3]	173,900	174,868	348,768	304,956	465,842	770,798	----------	459,582	459,582
Total buckwheat No. 1 and smaller	909,782	864,975	1,774,757	2,102,263	2,433,625	4,535,888	821,678	1,426,225	2,247,903
Grand total	1,615,175	1,342,713	2,957,888	2,876,478	3,764,689	6,641,167	2,097,238	2,326,976	4,424,214
Value:									
Lump [2] and broken	----------	----------	----------	----------	----------	----------	$12,464	$743	$13,207
Egg	$1,401,592	$83,404	$1,484,996	$747,739	$52,644	$800,383	2,668,791	48,924	2,717,715
Stove	3,406,829	1,001,863	4,408,692	3,387,976	4,638,832	8,026,808	6,547,710	1,784,219	8,331,929
Chestnut	2,815,379	2,694,365	5,509,744	2,800,267	6,530,341	9,330,608	4,703,932	4,497,706	9,201,638
Pea	964,271	1,844,481	2,808,752	1,750,733	3,488,103	5,238,836	1,767,398	4,288,522	6,055,920
Total pea and larger	8,588,071	5,624,113	14,212,184	8,686,715	14,709,920	23,396,635	15,700,295	10,620,114	26,320,409
Buckwheat No. 1	990,339	1,897,332	2,887,671	2,869,761	3,987,612	6,857,373	1,916,049	3,796,733	5,712,782
Buckwheat No. 2 (rice)	472,237	2,247,588	2,719,825	1,867,746	3,858,647	5,726,393	1,122,886	2,740,242	3,863,128
Buckwheat No. 3 (barley)	888,232	1,394,920	2,283,152	2,275,333	4,096,688	6,372,021	2,281,936	1,219,362	3,501,298
Buckwheat No. 4	601,029	309,162	910,191	1,414,706	852,999	2,267,705	558,047	416,008	974,055
Buckwheat No. 5	1,901,618	72,276	1,973,894	2,941,000	1,267,753	4,208,753	431,331	215,778	647,109
Other [3]	521,700	519,158	1,040,858	1,044,782	1,606,593	2,651,375	----------	829,336	829,336
Total buckwheat No. 1 and smaller	5,375,155	6,440,436	11,815,591	12,413,328	15,670,292	28,083,620	6,310,249	9,217,459	15,527,708
Grand total	13,963,226	12,064,549	26,027,775	21,100,043	30,380,212	51,480,255	22,010,544	19,837,573	41,848,117

Average value per ton:									
Lump [2] and broken	----------	----------	----------	----------	----------	----------	$12.39	$12.38	$12.39
Egg	$12.97	$12.53	$12.95	$12.70	$12.06	$12.65	13.12	13.13	13.12
Stove	12.62	12.62	12.62	11.83	11.66	11.73	12.57	12.61	12.58
Chestnut	12.40	12.60	12.50	11.66	11.69	11.68	12.43	12.58	12.51
Pea	9.59	10.37	10.09	9.28	9.42	9.37	10.28	10.77	10.62
Total pea and larger	12.17	11.77	12.01	11.22	11.05	11.11	12.31	11.79	12.09
Buckwheat No. 1	9.26	9.29	9.28	8.81	8.60	8.69	8.97	9.53	9.34
Buckwheat No. 2 (rice)	9.38	9.72	9.66	8.35	8.61	8.53	9.30	9.48	9.42
Buckwheat No. 3 (barley)	7.63	7.53	7.57	7.10	7.12	7.12	7.37	7.51	7.42
Buckwheat No. 4	5.51	5.69	5.57	5.38	5.06	5.26	6.04	5.54	5.82
Buckwheat No. 5	5.39	4.84	5.36	4.42	4.05	4.31	5.04	5.17	5.08
Other [3]	3.00	2.97	2.98	3.43	3.45	3.44	----------	1.80	1.80
Total buckwheat No. 1 and smaller	5.91	7.45	6.66	5.90	6.44	6.19	7.68	6.46	6.91
Grand total	8.65	8.99	8.80	7.34	8.07	7.75	10.50	8.53	9.46

See footnotes at end of table.

Table 4.—Commercial production of Pennsylvania anthracite in 1965, by regions and sizes—Continued

Size	Total preparation plants			From river dredging			Total		
	Rail	Truck	Total	Rail	Truck	Total	Rail	Truck	Total
Net tons:									
Lump [2] and broken	1,006	60	1,066	----------	----------	----------	1,006	60	1,066
Egg	370,272	14,748	385,020	----------	----------	----------	370,272	14,748	385,020
Stove	1,077,100	618,775	1,695,875	----------	----------	----------	1,077,100	618,775	1,695,875
Chestnut	845,578	1,129,893	1,975,471	----------	----------	----------	845,578	1,129,893	1,975,471
Pea	461,212	946,077	1,407,289	----------	----------	----------	461,212	946,077	1,407,289
Total pea and larger	2,755,168	2,709,553	5,464,721	----------	----------	----------	2,755,168	2,709,553	5,464,721
Buckwheat No. 1	646,140	1,065,950	1,712,090	----------	62	62	646,140	1,066,012	1,712,152
Buckwheat No. 2 (rice)	394,772	968,357	1,363,129	----------	803	803	394,772	969,160	1,363,932
Buckwheat No. 3 (barley)	746,338	922,838	1,669,176	----------	1,644	1,644	746,338	924,482	1,670,820
Buckwheat No. 4	464,314	297,864	762,178	----------	20,280	20,280	464,314	318,144	782,458
Buckwheat No. 5	1,103,303	369,524	1,472,827	----------	104,070	104,070	1,103,303	473,594	1,576,897
Other [3]	478,856	1,100,292	1,579,148	557,669	15,329	572,998	1,036,525	1,115,621	2,152,146
Total buckwheat No. 1 and smaller	3,833,723	4,724,825	8,558,548	557,669	142,188	699,857	4,391,392	4,867,013	9,258,405
Grand total	6,588,891	7,434,378	14,023,269	557,669	142,188	699,857	7,146,560	7,576,566	14,723,126
Value:									
Lump [2] and broken	$12,464	$743	$13,207	----------	----------	----------	$12,464	$743	$13,207
Egg	4,818,122	184,972	5,003,094	----------	----------	----------	4,818,122	184,972	5,003,094
Stove	13,342,515	7,424,914	20,767,429	----------	----------	----------	13,342,515	7,424,914	20,767,429
Chestnut	10,319,578	13,722,412	24,041,990	----------	----------	----------	10,319,578	13,722,412	24,041,990
Pea	4,482,402	9,621,106	14,103,508	----------	----------	----------	4,482,402	9,621,106	14,103,508
Total pea and larger	32,975,081	30,954,147	63,929,228	----------	----------	----------	32,975,081	30,954,147	63,929,228
Buckwheat No. 1	5,776,149	9,681,677	15,457,826	----------	$430	$430	5,776,149	9,682,107	15,458,256
Buckwheat No. 2 (rice)	3,462,869	8,846,477	12,309,346	----------	5,190	5,190	3,462,869	8,851,667	12,314,536
Buckwheat No. 3 (barley)	5,445,501	6,710,970	12,156,471	----------	10,053	10,053	5.445,501	6,721,023	12,166,524
Buckwheat No. 4	2,573,782	1,578,169	4,151,951	----------	71,760	71,760	2,573,782	1,649,929	4,223,711
Buckwheat No. 5	5,273,949	1,555,807	6,829,756	----------	333,135	333,135	5,273,949	1,888,942	7,162,891
Other [3]	1,566,482	2,955,087	4,521,569	$1,852,471	61,835	1,914,306	3,418,953	3,016,922	6,435,875
Total buckwheat No. 1 and smaller	24,098,732	31,328,187	55,426,919	1,852,471	482,403	2,334,874	25,951,203	31,810,590	57,761,793
Grand total	57,073,813	62,282,334	119,356,147	1,852,471	482,403	2,334,874	58,926,284	62,764,737	121,691,021

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Average value per ton:									
Lump [2] and broken	$12.39	$12.38	$12.39	----------	----------	----------	$12.39	$12.38	$12.39
Egg	13.01	12.54	12.99	----------	----------	----------	13.01	12.54	12.99
Stove	12.39	12.00	12.25	----------	----------	----------	12.39	12.00	12.25
Chestnut	12.20	12.14	12.17	----------	----------	----------	12.20	12.14	12.17
Pea	9.72	10.17	10.02	----------	----------	----------	9.72	10.17	10.02
Total pea and larger	11.97	11.42	11.70	----------	----------	----------	11.97	11.42	11.70
Buckwheat No. 1	8.94	9.08	9.03	----------	$6.94	$6.94	8.94	9.08	9.03
Buckwheat No. 2 (rice)	8.77	9.14	9.03	----------	6.46	6.46	8.77	9.13	9.03
Buckwheat No. 3 (barley)	7.30	7.27	7.28	----------	6.11	6.11	7.30	7.27	7.28
Buckwheat No. 4	5.54	5.30	5.45	----------	3.54	3.54	5.54	5.19	5.40
Buckwheat No. 5	4.78	4.21	4.64	----------	3.20	3.20	4.78	3.99	4.54
Other [3]	3.27	2.69	2.86	$3.32	4.03	3.34	3.30	2.70	2.99
Total buckwheat No. 1 and smaller	6.29	6.63	6.48	3.32	3.39	3.34	5.91	6.54	6.24
Grand total	8.66	8.38	8.51	3.32	3.39	3.34	8.25	8.28	8.27

[1] Includes Sullivan County.
[2] Quantity of lump included is insignificant.
[3] Includes various mixtures of buckwheat Nos. 2 to 5 and coal of relatively low dollar value.

Table 5.—Sizes of Pennsylvania anthracite prepared at plants in 1965, by regions, in percent of total

(Excludes dredge coal)

Size	Lehigh region			Schuylkill region		
	Shipped by rail	Shipped by truck	Total	Shipped by rail	Shipped by truck	Total
Lump [1] and broken	---	---	---	---	---	---
Egg	6.7	0.5	3.9	2.0	0.1	1.0
Stove	16.7	5.9	11.8	10.0	10.6	10.3
Chestnut	14.1	15.9	14.9	8.3	14.9	12.0
Pea	6.2	13.3	9.4	6.6	9.8	8.4
Total pea and larger	43.7	35.6	40.0	26.9	35.4	31.7
Buckwheat No. 1	6.6	15.2	10.5	11.3	12.3	11.9
Buckwheat No. 2 (rice)	3.1	17.2	9.5	7.8	11.9	10.1
Buckwheat No. 3 (barley)	7.2	13.8	10.2	11.2	15.3	13.5
Buckwheat No. 4	6.7	4.1	5.5	9.1	4.5	6.5
Buckwheat No. 5	21.9	1.1	12.5	23.1	8.3	14.7
Other [2]	10.8	13.0	11.8	10.6	12.3	11.6
Total buckwheat No. 1 and smaller	56.3	64.4	60.0	73.1	64.6	68.3
	Wyoming region [3]			**Total**		
Lump [1] and broken	0.1	(4)	(4)	(4)	(4)	(4)
Egg	9.7	0.1	4.7	5.6	0.2	2.8
Stove	24.8	6.1	15.0	16.4	8.3	12.1
Chestnut	18.0	15.4	16.6	12.8	15.2	14.1
Pea	8.2	17.1	12.9	7.0	12.7	10.0
Total pea and larger	60.8	38.7	49.2	41.8	36.4	39.0
Buckwheat No. 1	10.2	17.1	13.8	9.8	14.4	12.2
Buckwheat No. 2 (rice)	5.8	12.4	9.2	6.0	13.0	9.7
Buckwheat No. 3 (barley)	14.7	7.0	10.7	11.3	12.4	11.9
Buckwheat No. 4	4.4	3.2	3.8	7.1	4.0	5.4
Buckwheat No. 5	4.1	1.8	2.9	16.7	5.0	10.5
Other [2]	---	19.8	10.4	7.3	14.8	11.3
Total buckwheat No. 1 and smaller	39.2	61.3	50.8	58.2	63.6	61.0

[1] Quantity of lump included is insignificant.
[2] Includes various mixtures of buckwheat Nos. 2 to 5 and coal of relatively low dollar value.
[3] Includes Sullivan County.
[4] Less than 0.05 percent.

Table 6.—Sizes of Pennsylvania anthracite prepared at plants, by regions, in percent of total
(Excludes dredge coal)

Size	Lehigh region					Schuylkill region				
	1961	1962	1963	1964	1965	1961	1962	1963	1964	1965
Lump [1] and broken	([2])	---	---	---	---	([2])	([2])	([2])	([2])	---
Egg	1.8	3.1	2.3	3.3	3.9	0.6	0.9	1.1	0.9	1.0
Stove	11.6	10.7	9.7	11.8	11.8	12.0	12.2	11.9	11.3	10.3
Chestnut	15.9	12.5	11.7	14.1	14.9	15.8	15.4	15.0	14.2	12.0
Pea	11.2	10.8	10.1	10.3	9.4	10.3	10.7	10.3	9.1	8.4
Total pea and larger	40.5	37.1	33.8	39.5	40.0	38.7	39.2	38.3	35.5	31.7
Buckwheat No. 1	12.3	11.0	9.3	10.4	10.5	11.7	12.4	12.3	11.3	11.9
Buckwheat No. 2 (rice)	8.9	8.6	8.7	10.5	9.5	9.2	9.5	9.7	9.3	10.1
Buckwheat No. 3 (barley)	10.2	8.8	9.8	11.0	10.2	12.0	11.1	11.2	11.7	13.5
Buckwheat No. 4	9.0	6.8	7.8	6.8	5.5	7.2	7.2	6.8	6.6	6.5
Buckwheat No. 5	11.1	10.6	16.8	12.1	12.5	10.8	12.7	12.8	13.3	14.7
Other [3]	8.0	17.1	13.8	9.7	11.8	10.4	7.9	8.9	12.3	11.6
Total buckwheat No. 1 and smaller	59.5	62.9	66.2	60.5	60.0	61.3	60.8	61.7	64.5	68.3
	Wyoming region [4]					Total				
Lump [1] and broken	0.1	([2])	([2])	([2])	([2])	0.1	([2])	([2])	([2])	([2])
Egg	1.9	4.4	4.9	4.6	4.7	1.2	2.5	2.6	2.5	2.8
Stove	15.3	15.8	16.7	15.2	15.0	13.0	13.2	13.0	12.6	12.1
Chestnut	20.2	17.7	18.5	17.3	16.6	17.3	15.6	15.4	15.2	14.1
Pea	14.5	13.8	13.9	12.9	12.9	11.8	11.8	11.4	10.5	10.0
Total pea and larger	52.0	51.7	54.0	50.0	49.2	43.4	43.1	42.4	40.8	39.0
Buckwheat No. 1	15.1	15.1	15.1	13.9	13.8	12.9	13.1	12.6	11.9	12.2
Buckwheat No. 2 (rice)	9.4	9.1	9.3	9.2	9.2	9.2	9.2	9.3	9.5	9.7
Buckwheat No. 3 (barley)	11.3	10.5	10.9	10.3	10.7	11.5	10.5	10.8	11.1	11.9
Buckwheat No. 4	3.0	2.3	2.4	2.2	3.8	6.1	5.4	5.6	5.3	5.4
Buckwheat No. 5	4.3	4.8	4.0	3.1	2.9	8.7	9.5	10.8	9.9	10.5
Other [3]	4.9	6.5	4.3	11.3	10.4	8.2	9.2	8.5	11.5	11.3
Total buckwheat No. 1 and smaller	48.0	48.3	46.0	50.0	50.8	56.6	56.9	57.6	59.2	61.0

[1] Quantity of lump included is insignificant.
[2] Less than 0.05 percent.
[3] Includes various mixtures of buckwheat Nos. 2 to 5 and coal of relatively low dollar value.
[4] Includes Sullivan County.

Table 7.—Production of Pennsylvania anthracite in 1965, by regions

Region	Production							
	Rail shipments		Truck shipments		Colliery fuel		Total	
	Net tons	Value [1]	Net tons	Value [1]	Net tons	Value	Net tons	Value [1]
Lehigh: Preparation plants	1,615,175	$13,963,226	1,342,713	$12,064,549	8,155	$72,389	2,966,043	$26,100,164
Schuylkill:								
Preparation plants	2,876,478	21,100,043	3,764,689	30,380,212	7,508	60,749	6,648,675	51,541,004
Dredges	557,669	1,852,471	142,188	482,403	600	1,800	700,457	2,336,674
Total Schuylkill	3,434,147	22,952,514	3,906,877	30,862,615	8,108	62,549	7,349,132	53,877,678
Wyoming:								
Preparation plants [2]	2,097,238	22,010,544	2,326,976	19,837,573	126,566	195,308	4,550,780	42,043,425
Total:								
Preparation plants	6,588,891	57,073,813	7,434,378	62,282,334	142,229	328,446	14,165,498	119,684,593
Dredges	557,669	1,852,471	142,188	482,403	600	1,800	700,457	2,336,674
Grand total	7,146,560	58,926,284	7,576,566	62,764,737	142,829	330,246	14,865,955	122,021,267

[1] Value given for shipments is that at which coal left possession of producing company; does not include selling expenses.
[2] Includes Sullivan County.

Table 8.—Pennsylvania anthracite produced, 1961–65, by fields, in net tons

Field	1961	1962	1963	1964	1965
Eastern Middle: Breakers and washeries	2,002,163	2,257,038	2,657,499	2,188,777	2,026,884
Western Middle:					
Breakers and washeries	4,673,983	3,723,273	4,270,454	4,492,491	3,427,959
Dredges	58,287	41,105	36,095	33,667	36,231
Total	4,732,270	3,764,378	4,306,549	4,526,158	3,464,190
Southern:					
Breakers and washeries	4,486,037	4,515,339	4,857,977	4,591,944	4,159,875
Dredges	687,561	685,946	655,635	671,581	664,226
Total	5,173,598	5,201,285	5,513,612	5,263,525	4,824,101
Northern: Breakers and washeries [1]	5,538,408	5,670,945	5,789,724	5,205,791	4,550,780
Total:					
Breakers and washeries	16,700,591	16,166,595	17,575,654	16,479,003	14,165,498
Dredges	745,848	727,051	691,730	705,248	700,457
Grand total	17,446,439	16,893,646	18,267,384	17,184,251	14,865,955

[1] Includes Sullivan County.

Table 9.—Production of Pennsylvania anthracite in 1965, by counties

County	Production							
	Rail shipments		Truck shipments		Colliery fuel		Total	
	Net tons	Value [1]	Net tons	Value [1]	Net tons	Value	Net tons	Value [1]
Berks, Lancaster, and Snyder	557,329	$1,850,771	95,389	$309,707	------	------	652,718	$2,160,478
Carbon	345,009	3,108,820	70,477	253,189	590	$3,020	416,076	3,365,029
Columbia	460,782	4,275,739	144,982	1,207,185	292	2,444	606,056	5,485,368
Dauphin	117,409	427,715	73,611	378,330	50	350	191,070	806,395
Lackawanna	395,915	4,004,997	308,114	3,267,557	574	3,594	704,603	7,276,148
Lebanon	29,070	182,897	1,292	9,723	------	------	30,362	192,620
Luzerne	2,648,723	25,675,733	2,674,127	22,602,385	133,214	257,777	5,456,064	48,535,895
Northumberland	523,954	3,106,552	1,053,166	8,446,224	670	2,450	1,577,790	11,555,226
Schuylkill	2,067,538	16,287,172	3,131,330	26,149,132	7,439	60,611	5,206,307	42,496,915
Sullivan	70	563	22,445	126,532	------	------	22,515	127,095
Susquehanna	761	5,325	1,633	14,773	------	------	2,394	20,098
Total	7,146,560	58,926,284	7,576,566	62,764,737	142,829	330,246	14,865,955	122,021,267

[1] Value given for shipments is that at which coal left possession of producing company; does not include selling expenses.

Underground Mines.—Production from underground mines again decreased sharply (592,000 tons less than in 1964). The decrease was attributable primarily to the sharp decline in the shipment of fresh-mined large sizes to European markets, exclusive of the anthracite shipped to U.S. Armed Forces in West Germany. Of total underground production, the Lehigh region accounted for 2 percent (1 percent in 1964); the Schuylkill region dropped to 49 percent (53 percent in 1964); and the Wyoming region rose to 49 percent (46 percent in 1964). In the Lehigh region, production from underground mines rose slightly (2 percent); however, production in the Schuylkill and the Wyoming regions declined—the Schuylkill by 528,000 tons, or 17 percent, and the Wyoming by 65,000 tons, or 2 percent. Detailed data on production by source, fields, and regions are shown in tables 10 and 11. Figures 2 and 3 show trends in production by source.

Table 10.—Pennsylvania anthracite produced in 1965, classified as fresh-mined, culm-bank, and river coal, by fields, in net tons

Field	Fresh-mined coal				From culm banks	From river dredging	Total
	Underground mines			Strip pits			
	Mechanically loaded	Hand loaded	Total				
Eastern Middle	42,916	14,368	57,284	1,289,289	680,311	------	2,026,884
Western Middle	256,544	724,615	981,159	1,519,593	927,207	36,231	3,464,190
Southern	399,161	1,249,435	1,648,596	1,905,244	606,035	664,226	4,824,101
Northern [1]	2,547,413	62,537	2,609,950	1,224,856	715,974	------	4,550,780
Total	3,246,034	2,050,955	5,296,989	5,938,982	2,929,527	700,457	14,865,955

[1] Includes Sullivan County.

Table 11.—Pennsylvania anthracite produced in 1965, classified as fresh-mined, culm-bank, and river coal, by regions, in net tons

Region	Fresh-mined coal				From culm banks	From river dredging	Total
	Underground mines			Strip pits			
	Mechanically loaded	Hand loaded	Total				
Lehigh	42,916	39,998	82,914	2,050,041	833,088	------	2,966,043
Schuylkill	655,705	1,948,420	2,604,125	2,664,085	1,380,465	700,457	7,349,132
Wyoming [1]	2,547,413	62,537	2,609,950	1,224,856	715,974	------	4,550,780
Total	3,246,034	2,050,955	5,296,989	5,938,982	2,929,527	700,457	14,865,955

[1] Includes Sullivan County.

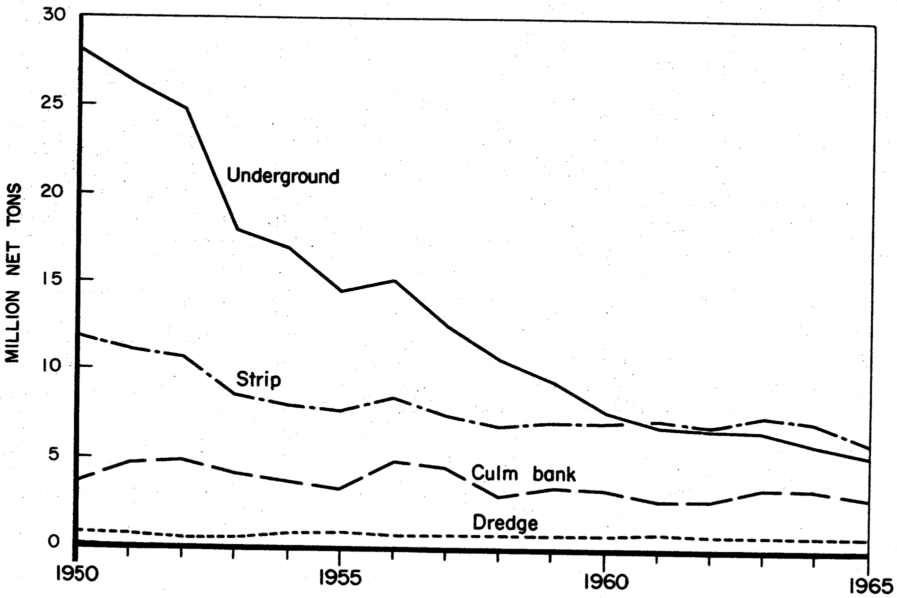

Figure 2.—Production of Pennsylvania anthracite, by sources, 1950–65.

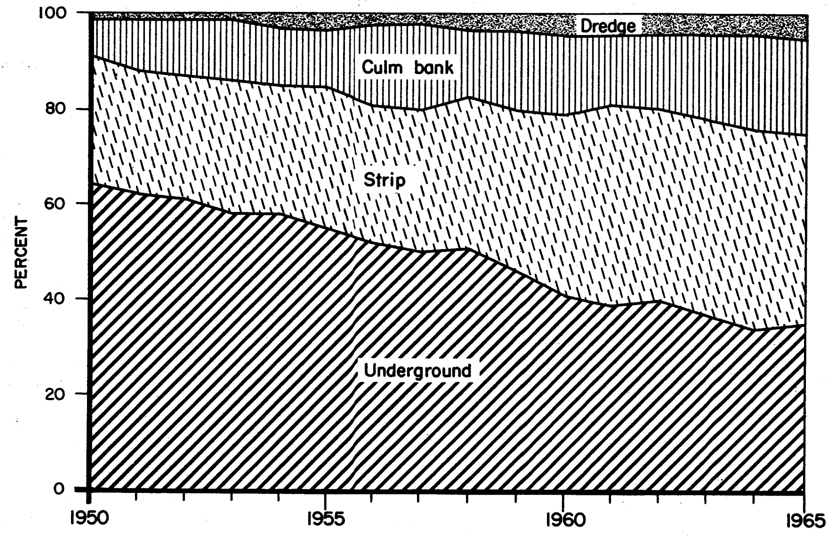

Figure 3.—Production of Pennsylvania anthracite, by sources, 1950–65, in percent of total.

Strip Pits.—Production at stripping operations declined 17 percent in 1965. Each of the producing regions reported losses for the year. In the Schuylkill region, which has been the leader in this type of mining for many years, strip output declined 21 percent from the 1964 level. Production of strip coal in the Wyoming region was 25 percent lower; and, in the Lehigh region, 6 percent below the 1964 level. Of the total fresh-mined coal (strip plus underground) produced in the Lehigh region in 1965, 96 percent originated at strip pits; in Schuylkill, 51 percent; and in the Wyoming region, 32 percent. Comparable figures for 1964 were 96, 52, and 38 percent, respectively. Table 12 shows detailed data on strip-pit production for selected years in the period 1915–65. Figure 4 shows regional production of strip coal for 1950–65.

Table 12.—Production of Pennsylvania anthracite from strip pits

	Mined by stripping (net tons)	Percent of fresh-mined total	Number of men employed	Average number of days worked
1915	1,121,603	NA	NA	NA
1920	2,054,441	2.5	NA	NA
1925	1,578,478	2.7	NA	NA
1930	2,536,288	3.8	NA	NA
1958	6,877,761	39.1	4,418	196
1959	7,096,343	43.0	3,775	200
1960	7,112,288	48.0	3,470	195
1961	7,246,646	51.6	3,194	207
1962	6,822,207	50.6	3,008	206
1963	7,467,842	52.7	3,025	224
1964	7,177,188	54.9	3,075	217
1965:				
Lehigh region	2,050,041	96.1	756	253
Schuylkill region	2,664,085	50.6	1,067	175
Wyoming region [1]	1,224,856	31.9	526	251
Total	5,938,982	52.9	2,349	217

NA Not available.
[1] Includes Sullivan County.

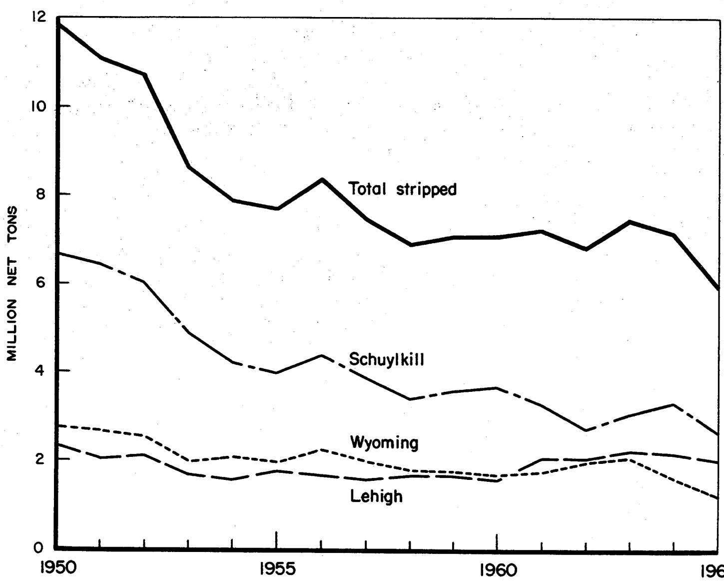

Figure 4.—Pennsylvania anthracite mined from strip pits, by regions, 1950–65.

Culm Banks.—Because of less demand for the smaller sizes of anthracite, output from culm banks dropped sharply in 1965 (14 percent). This decline was reflected in each region; the Wyoming losing 20 percent; the Schuylkill, 13 percent; and the Lehigh, 11 percent. Output from banks in 1965 was divided as follows: Schuylkill region, 47 percent; Lehigh region, 28 percent; and, the Wyoming region, 25 percent. These figures compare with 46, 28, and 26 percent, respectively, in 1964. Production of Pennsylvania anthracite from culm and silt banks is shown in tables 10, 11, and 13.

Table 13.—Production of Pennsylvania anthracite from culm banks, by regions, in net tons

	Lehigh region	Schuylkill region	Wyoming region	Sullivan County	Total
1935	192,790	1,748,960	760,718	-----	2,702,468
1936	136,058	2,532,116	525,798	-----	3,193,972
1937	101,239	2,178,482	442,878	-----	2,722,599
1938	53,037	1,941,896	345,511	-----	2,340,444
1939	64,180	2,159,548	360,086	-----	2,583,814
1940	192,878	2,109,557	480,603	-----	2,783,038
1941	326,755	2,881,049	449,062	-----	3,656,866
1942	745,934	3,529,757	459,373	-----	4,735,064
1943	1,944,047	4,577,917	1,041,841	19,893	7,583,698
1944	2,125,317	5,787,036	1,673,994	13,833	9,600,180
1945	2,086,864	4,936,907	1,728,440	34,448	8,786,659
1946	1,875,590	4,752,141	1,780,874	22,487	8,431,092
1947	1,044,501	3,947,016	1,409,217	2,912	6,403,646
1948	796,114	3,729,542	1,098,123	-----	5,623,779
1949	694,763	2,778,131	956,250	-----	4,429,144
1950	366,069	2,533,535	565,829	1,877	3,467,310
1951	566,613	3,578,795	484,792	-----	4,630,200
1952	791,445	3,407,974	566,097	-----	4,765,516
1953	714,646	2,792,323	504,031	-----	4,011,000
1954	797,761	2,320,006	447,715	-----	3,565,482
1955	862,539	1,934,492	416,015	-----	3,213,046
1956	1,493,381	2,750,838	530,580	-----	4,774,799
1957	1,457,869	2,479,241	584,300	-----	4,521,410
1958	605,741	1,742,356	550,756	3,900	2,902,753
1959	831,254	1,905,465	[1] 684,135	([1])	3,420,854
1960	825,825	1,563,746	907,441	-----	3,297,012
1961	656,528	1,377,204	635,627	-----	2,669,359
1962	974,650	949,710	747,106	-----	2,671,466
1963	1,297,590	1,389,314	706,162	-----	3,393,066
1964	935,726	1,580,290	896,973	-----	3,412,989
1965	833,088	1,380,465	715,974	-----	2,929,527

[1] Sullivan County included in Wyoming region.

Dredge Coal.—Dredging operations were conducted at virtually the same level as in 1964, with the total of 700,000 tons being only 4,800 tons less than in the previous year. As the preponderant part of the river coal produced is "captive" tonnage (coal used by the producer) it is not nearly so responsive to fluctuations in the general market as are the small sizes produced from other sources. Tables 14 and 15 contain data on recovery of anthracite from rivers and their tributaries.

Table 14.—Pennsylvania anthracite produced by dredges in 1965, by rivers
(Including tributaries)

River	Production (net tons)	Value	
		Total	Average
Schuylkill	86,106	$289,067	$3.36
Susquehanna	614,351	2,047,607	3.33
Total	700,457	2,336,674	3.34

Table 15.—Pennsylvania anthracite produced by dredges, by rivers
(Including tributaries)

	Lehigh River (net tons)	Schuylkill River (net tons)	Susquehanna River (net tons)	Total (net tons)	Total value	Average value (per ton)
1940	[1] 78,947	(1)	863,997	942,944	$1,097,000	$1.16
1941	47,838	396,522	1,073,203	1,517,563	1,839,784	1.21
1942	9,385	268,919	1,006,729	1,285,033	1,478,719	1.15
1943	37,452	342,815	954,470	1,334,737	1,972,777	1.48
1944	40,894	494,371	837,472	1,372,737	2,084,431	1.52
1945	41,409	366,161	797,656	1,205,226	1,924,148	1.60
1946	37,441	247,757	847,196	1,132,394	2,091,324	1.85
1947	46,478	158,102	1,015,126	1,219,706	2,480,068	2.03
1948	54,284	67,871	865,849	988,004	2,291,752	2.32
1949	22,131	52,012	790,979	865,122	2,131,096	2.46
1950	21,877	34,222	563,465	619,564	1,677,508	2.71
1951	25,344	27,454	508,770	561,568	1,576,576	2.81
1952	17,402	30,407	324,245	372,054	1,109,778	2.98
1953	31,391	20,643	386,147	438,181	1,449,149	3.31
1954	16,015	------	709,892	725,907	1,810,026	2.49
1955	29,935	60,256	698,652	788,843	1,844,835	2.34
1956	44,262	5,540	666,485	716,287	1,273,415	1.78
1957	30,650	10,167	616,884	657,701	1,143,152	1.74
1958	30,763	10,230	650,800	691,793	1,324,943	1.92
1959	13,312	13,213	690,094	716,619	2,310,895	3.22
1960	22,700	23,624	665,839	712,163	2,257,367	3.17
1961	2,975	122,880	619,993	745,848	2,355,314	3.16
1962	-----	98,076	628,975	727,051	2,475,987	3.41
1963	-----	83,768	607,962	691,730	2,469,101	3.57
1964	-----	97,957	607,291	705,248	2,359,193	3.35
1965	-----	86,106	614,351	700,457	2,336,674	3.34

[1] Schuylkill included with Lehigh in 1940.

Weekly and Monthly Data.—The Bureau publishes a series of weekly reports containing estimates of weekly and monthly production of Pennsylvania anthracite, as well as a record of daily and weekly carloadings. Estimates of production are derived primarily from factors based on carloading data furnished by the Association of American Railroads. Secondary factors are those for colliery fuel, river coal, and truck shipments. The weekly and monthly estimates have been adjusted to the production total for 1965 and are presented in tables 16 and 17. The weekly anthracite report also contains supplementary monthly tables on rail and truck shipments, consumption, retail-dealer stocks and deliveries, exports, and other related subjects. Requests to be placed on the mailing list for this publication should be addressed to the Bureau of Mines.

Table 16.—Estimated production of Pennsylvania anthracite, in 1965 [1]

Week ended—	Thousand net tons	Week ended—	Thousand net tons	Week ended—	Thousand net tons
Jan. 2	-----	May 15	325	Sept. 25	348
9	259	22	314	Oct. 2	303
16	267	29	322	9	311
23	356	June 5	294	16	296
30	333	12	364	23	288
Feb. 6	240	19	381	30	281
13	265	26	386	Nov. 6	271
20	250	July 3	233	13	277
27	251	10	99	20	315
Mar. 6	256	17	316	27	233
13	261	24	346	Dec. 4	296
20	268	31	356	11	291
27	280	Aug. 7	322	18	303
Apr. 3	259	14	275	25	239
10	261	21	257	31	221
17	284	28	259		
24	231	Sept. 4	296	Total	14,866
May 1	290	11	234		
8	295	18	308		

[1] Estimated from weekly carloadings as reported by the Association of American Railroads and other factors; adjusted to annual production from Bureau of Mines canvass.

Table 17.—Estimated monthly production of Pennsylvania anthracite, in thousand net tons [1]

Month	1957	1958	1959	1960	1961	1962	1963	1964	1965
January	2,625	2,161	2,318	1,701	1,767	1,810	1,799	1,668	1,215
February	2,072	1,753	1,645	1,643	1,721	1,522	1,529	1,520	1,006
March	1,798	1,476	1,593	1,749	1,438	1,513	1,489	1,211	1,256
April	2,037	1,545	1,588	1,281	1,173	1,257	1,195	1,454	1,127
May	2,294	1,612	1,466	1,313	1,418	1,319	1,524	1,636	1,264
June	2,551	1,963	1,777	1,496	1,344	1,339	1,455	1,816	1,565
July	1,478	1,377	1,206	1,186	1,178	906	1,124	1,182	1,209
August	2,294	1,750	1,600	1,704	1,533	1,328	1,606	1,306	1,244
September	2,173	2,050	1,823	1,580	1,394	1,193	1,574	1,300	1,313
October	2,262	1,966	1,805	1,678	1,603	1,528	1,822	1,337	1,221
November	1,928	1,559	1,863	1,692	1,501	1,664	1,615	1,340	1,208
December	1,826	1,959	1,965	1,794	1,376	1,515	1,535	1,414	1,238
Total	25,338	21,171	20,649	18,817	17,446	16,894	18,267	17,184	14,866

[1] Production is estimated from weekly carloadings, as reported by the Association of American Railroads, and includes mine fuel, coal sold locally, and dredge coal.

Mechanical Loading.—The Western Middle field, dropping 30 percent from the 1964 level, was primarily responsible for the decline in mechanical loading. The Southern and Northern fields registered more moderate decreases; however, mechanical loading increased 13 percent in the Eastern Middle field. Figure 5 shows trends in mechanical loading, hand loading, and stripping for 1950–65. Tables 18 and 19 present data on the tonnages loaded mechanically and the number and types of equipment used.

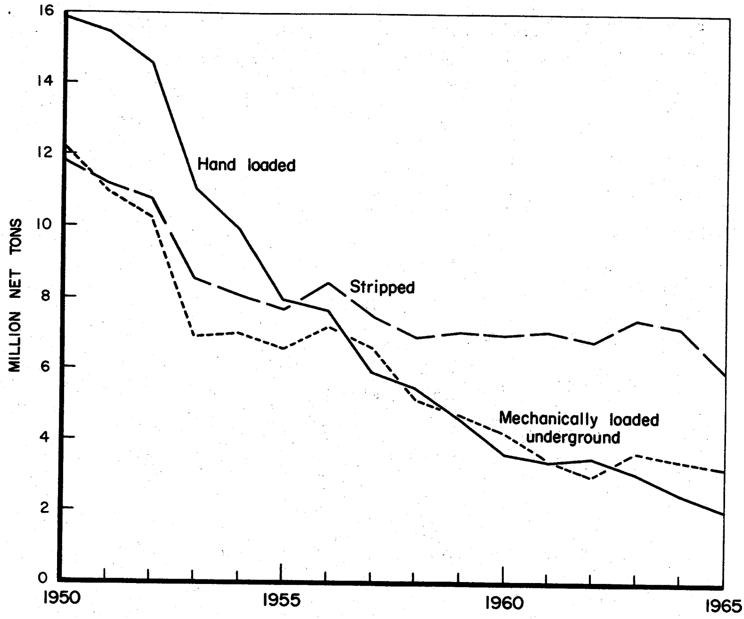

Figure 5.—Pennsylvania anthracite mechanically loaded, hand loaded, and stripped, 1950–65.

Table 18.—Pennsylvania anthracite loaded mechanically underground, by fields, in net tons

Field	Scraper loaders [1]		Pit-car loaders		Hand-loaded face conveyors, all types [2]		Total mechanically loaded	
	1964	1965	1964	1965	1964	1965	1964	1965
Northern	1,060,916	1,113,776	68,601	41,619	1,496,170	1,392,018	2,625,687	2,547,413
Eastern Middle	3,546	13,419	369	384	34,185	29,113	38,100	42,916
Western Middle	22,715	34,558	1,800	-----	342,032	221,986	366,547	256,544
Southern	155,672	138,079	7,500	6,000	261,528	255,082	424,700	399,161
Total	1,242,849	1,299,832	78,270	48,003	2,133,915	1,898,199	3,455,034	3,246,034

[1] Includes mobile loaders.
[2] Shaker chutes, including those equipped with duckbills.

Table 19.—Pennsylvania anthracite loaded mechanically underground, in net tons

Year	Scraper loaders		Mobile loaders		Conveyors [1] and pit-car loaders		Total loaded mechanically	
	Number of units	Net tons loaded	Number of units	Net tons loaded	Number of units	Net tons loaded	Number of units	Net tons loaded
1961	132	595,572	27	387,417	616	2,394,789	775	3,377,778
1962	128	541,241	34	296,259	536	2,227,864	698	3,065,364
1963	147	862,252	30	304,916	512	2,498,794	689	3,665,962
1964	139	750,293	31	492,556	495	2,212,185	689	3,455,034
1965	155	906,897	25	392,935	403	1,946,202	583	3,246,034

[1] Includes duckbills and other self-loading conveyors.

Table 20.—Trends in mechanical loading, hand loading, and stripping of Pennsylvania anthracite
(Mechanical loading includes coal handled on pit-car loaders and hand-loaded face conveyors)

Year	Fresh-mined coal							
	Underground					Strip pits		Total
	Mechanical loading (net tons)	Percent of total, underground	Hand loading (net tons)	Percent of total, underground	Total (net tons)	Net tons	Percent of total, fresh mined	
1927	[1] 2,223,281	3.0	71,434,537	97.0	73,657,818	2,153,156	2.8	75,810,974
1928	[1] 2,351,074	3.4	67,373,788	96.6	69,724,862	2,422,924	3.4	72,147,786
1929	3,470,158	5.0	66,493,690	95.0	69,963,848	1,911,766	2.7	71,875,614
1930	4,467,750	6.9	60,458,344	93.1	64,926,094	2,536,288	3.8	67,462,382
1931	4,384,780	8.2	49,074,722	91.8	53,459,502	3,813,237	6.7	57,272,739
1932	5,433,340	12.4	38,400,820	87.6	43,834,160	3,980,973	8.3	47,815,133
1933	6,557,267	16.0	34,474,844	84.0	41,032,111	4,932,069	10.7	45,964,180
1934	9,284,486	19.1	39,290,255	80.9	48,574,741	5,798,138	10.7	54,372,879
1935	9,279,057	21.2	34,503,819	78.8	43,782,876	5,187,072	10.6	48,969,948
1936	10,827,946	24.2	33,898,560	75.8	44,726,506	6,203,267	12.2	50,929,773
1937	10,683,837	25.1	31,882,514	74.9	42,566,351	5,696,018	11.8	48,262,369
1938	10,151,669	26.6	27,990,628	73.4	38,142,297	5,095,341	11.8	43,237,638
1939	11,773,833	27.7	30,797,715	72.3	42,571,548	5,486,479	11.4	48,058,027
1940	12,326,000	29.7	29,190,837	70.3	41,516,837	6,352,700	13.3	47,869,537
1941	13,441,987	30.6	30,435,277	69.4	43,877,264	7,316,574	14.3	51,193,838
1942	14,741,459	32.6	30,495,240	67.4	45,236,699	9,070,933	16.7	54,307,632
1943	14,745,793	34.5	27,990,005	65.5	42,735,798	8,989,387	17.4	51,725,185
1944	14,975,146	35.8	26,800,270	64.2	41,775,416	10,953,030	20.8	52,728,446
1945	13,927,955	39.9	20,957,744	60.1	34,885,699	10,056,325	22.4	44,942,024
1946	15,619,162	41.0	22,465,295	59.0	38,084,457	12,858,930	25.2	50,943,387
1947	16,054,011	43.4	20,909,101	56.6	36,963,112	12,603,545	25.4	49,566,657
1948	15,742,368	42.3	21,432,923	57.7	37,175,291	13,352,874	26.4	50,528,165
1949	11,858,088	43.9	15,172,562	56.1	27,030,650	10,376,808	27.7	37,407,458
1950	12,335,650	43.8	15,820,245	56.2	28,155,895	11,833,934	29.6	39,989,829
1951	10,847,787	41.2	15,494,452	58.8	26,342,239	11,135,990	29.7	37,478,229
1952	10,034,464	40.5	14,713,819	59.5	24,748,283	10,696,705	30.2	35,444,988
1953	6,838,769	38.2	11,054,720	61.8	17,893,489	8,606,482	32.5	26,499,971
1954	6,978,035	41.4	9,874,373	58.6	16,852,408	7,939,680	32.0	24,792,088
1955	6,660,939	45.9	7,837,819	54.1	14,498,758	7,703,907	34.7	22,202,665
1956	7,308,110	48.5	7,746,794	51.5	15,054,904	8,354,230	35.7	23,409,134
1957	6,657,479	52.8	5,958,574	47.2	12,616,053	7,543,157	37.4	20,159,210
1958	5,332,043	49.8	5,366,792	50.2	10,698,835	6,877,761	39.1	17,576,596
1959	4,700,542	49.9	4,714,928	50.1	9,415,470	7,096,343	43.0	16,511,813
1960	4,044,392	52.6	3,651,586	47.4	7,695,978	7,112,288	48.0	14,808,266
1961	3,377,778	49.8	3,406,808	50.2	6,784,586	7,246,646	51.6	14,031,232
1962	3,065,364	45.9	3,607,558	54.1	6,672,922	6,822,207	50.6	13,495,129
1963	3,665,962	54.6	3,048,784	45.4	6,714,746	7,467,842	52.7	14,182,588
1964	3,455,034	58.7	2,433,792	41.3	5,888,826	7,177,188	54.9	13,066,014
1965	3,246,034	61.3	2,050,955	38.7	5,296,989	5,938,982	52.9	11,235,971

[1] As reported by Commonwealth of Pennsylvania, Department of Mines.

Cutting Machines.—Two cutting machines were used in 1965, four less than in 1964. The total undercut before shooting fell from 417,000 tons in 1964 to 329,000 tons in 1965, all of which was produced in the Wyoming region.

Power Equipment.—With the decrease in strip mining of 17 percent, the number of power units reported used also declined. In 1965, 108 shovels and 206 draglines were reported used in strip mining—13 less shovels and 25 less draglines than in 1964. However, at bank operations 35 shovels and 28 draglines were reported used, an increase of 7 shovels and 2 draglines, although the recovery of coal from culm banks decreased 14 percent. Six shovels and seven draglines were employed during the year for both stripping and culm bank recovery, the same number as in 1964. Data on power shovels and draglines utilized by the anthracite industry in 1963–65 are shown in table 21.

Table 21.—Power shovels and draglines used in recovering coal from culm banks and in stripping Pennsylvania anthracite, by type of power

Type of power	1963			1964			1965		
	Number of power shovels	Number of draglines	Total	Number of power shovels	Number of draglines	Total	Number of power shovels	Number of draglines	Total
Gasoline	24	11	35	28	8	36	29	6	35
Electric	27	50	77	27	68	95	32	59	91
Diesel	94	182	276	97	184	281	84	175	259
Diesel-electric	1	3	4	3	4	7	4	1	5
Total	146	246	392	155	264	419	149	241	390

PRICES AND VALUE OF SALES

Based on total production, including colliery fuel and dredge coal, the value of Pennsylvania anthracite averaged $8.21 per short ton in 1965, a loss of 5 percent from the $8.65 per ton recorded in 1964. Total value of the year's output dropped to $122,021,000, or a decline of 18 percent. Production of the larger sizes dropped 18 percent, and the value 23 percent. In the smaller size group, production decreased 11 percent and the value 12 percent.

Average values were less than in 1964, with the exception of egg and buckwheat Nos. 3 and 4, which increased $0.05, $0.33 and $0.35 per ton, respectively. Average decreases for 1965 were $0.45 for lump and broken (average value for 1964, $12.84), $0.67 for stove ($12.92 in 1964), $0.75 for chestnut, ($12.92 in 1964), and, $0.80 for pea ($10.82 in 1964). As a result, the average value for the pea and larger group decreased from $12.38 to $11.70. Average value of the buckwheat No. 1 and smaller group was $6.48, a decrease of $0.08 from the 1964 level. Among this group the largest decrease was for buckwheat No. 1 ($0.66), followed by buckwheat No. 2 (rice) with a decline of $0.40; buckwheat No. 5, and "other" each dropped only $0.02 per ton. All of the foregoing individual size values exclude dredge coal.

As is customary in the Pennsylvania anthracite industry, spring discount prices were announced in late March and early April 1965. On egg and stove the spring prices represented a cut of $2.50 per net ton; on chestnut $2.25 to $2.50; on pea, $1.85 to $2.00; buckwheat No. 1, $1.00 to $1.15; buckwheat No. 2 (rice), $1.50 and $0.25 on buckwheat No. 3 (barley).

New prices were announced during July and, by the end of the month, the prices quoted in Saward's Journal were $0.50 higher on egg, stove, chestnut, and buckwheat No. 2. (rice), while pea, buckwheat No. 1 and No. 3 (barley) were $0.25 per ton higher. By the end of the year, the wholesale prices quoted in Saward's Journal were as follows: Egg and stove at $14.00 to $14.25; chestnut, $13.75 to $14.00; pea $10.75 to $11.25; buckwheat No. 1, $10.00; buckwheat No. 2 (rice), $9.75 and buckwheat No. 3 (barley) $8.50. Some companies charge an additional $0.25 for trademarking their coals.

Average values, f.o.b. preparation plants are presented by regions in tables 23, 24, and 25. Trends in shipments and value, by size groups, are shown in figure 6.

Table 22.—Standard anthracite specifications approved and adopted by the Anthracite Committee, effective July 28, 1947

Size	Round test mesh (inches)	Percent					
		Oversize, maximum	Undersize		Maximum impurities [1]		
			Maximum	Minimum	Slate	Bone	Ash [2]
Broken	Through $4\frac{3}{8}$	---	---	---	$1\frac{1}{2}$	2	11
	Over $3\frac{1}{4}$ to 3	---	15	$7\frac{1}{2}$	---	---	---
Egg	Through $3\frac{1}{4}$ to 3	5	---	---	$1\frac{1}{2}$	2	11
	Over $2\frac{7}{16}$	---	15	$7\frac{1}{2}$	---	---	---
Stove	Through $2\frac{7}{16}$	$7\frac{1}{2}$	---	---	2	3	11
	Over $1\frac{5}{8}$	---	15	$7\frac{1}{2}$	---	---	---
Chestnut	Through $1\frac{5}{8}$	$7\frac{1}{2}$	---	---	3	4	11
	Over $1\frac{3}{16}$	---	15	$7\frac{1}{2}$	---	---	---
Pea	Through $1\frac{3}{16}$	10	---	---	4	5	12
	Over $\frac{9}{16}$	---	15	$7\frac{1}{2}$	---	---	---
Buckwheat No. 1	Through $\frac{9}{16}$	10	---	---	---	---	13
	Over $\frac{5}{16}$	---	15	$7\frac{1}{2}$	---	---	---
Buckwheat No. 2 (rice)	Through $\frac{5}{16}$	10	---	---	---	---	13
	Over $\frac{3}{16}$	---	17	$7\frac{1}{2}$	---	---	---
Buckwheat No. 3 (barley)	Through $\frac{3}{16}$	10	---	---	---	---	15
	Over $\frac{3}{32}$	---	20	10	---	---	---
Buckwheat No. 4	Through $\frac{3}{32}$	20	---	---	---	---	15
	Over $\frac{3}{64}$	---	30	10	---	---	---
Buckwheat No. 5	Through $\frac{3}{64}$	30	No limit		---	---	16

[1] When slate content in sizes from broken to chestnut, inclusive, is less than above standards, bone content may be increased by $1\frac{1}{2}$ times the decrease in slate content under the allowable limits, but slate content specified above shall not be exceeded in any event.

A tolerance of 1 percent is allowed on maximum percentage of undersize and maximum percentage of ash content.

Maximum percentage of undersize is applicable only to anthracite as it is produced at preparation plant. Slate is defined as any material that has less than 40 percent fixed carbon.

Bone is defined as any material that has 40 percent or more, but less than 75 percent, fixed carbon.

[2] Ash determinations are on a dry basis.

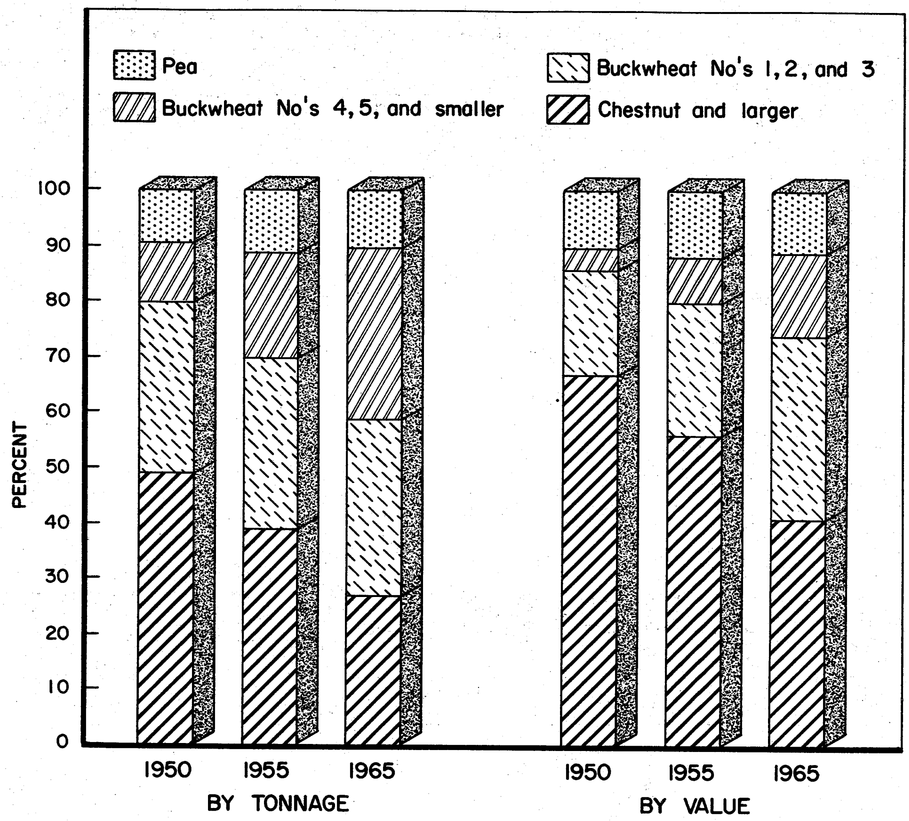

Figure 6.—Shipments of Pennsylvania anthracite, 1950, 1955, and 1965, by size groups, in percent of total tonnage and total value.

Table 23.—Average sales realization per net ton of Pennsylvania anthracite at preparation plants in 1965, by regions and sizes

(Excludes dredge coal)

Size	Lehigh region			Schuylkill region		
	Shipped by rail	Shipped by truck	Total	Shipped by rail	Shipped by truck	Total
Lump [1] and broken	----	----	----	----	----	----
Egg	$12.97	$12.53	$12.95	$12.70	$12.06	$12.65
Stove	12.62	12.62	12.62	11.83	11.66	11.73
Chestnut	12.40	12.60	12.50	11.66	11.69	11.68
Pea	9.59	10.37	10.09	9.28	9.42	9.37
Total pea and larger	12.17	11.77	12.01	11.22	11.05	11.11
Buckwheat No. 1	9.26	9.29	9.28	8.81	8.60	8.69
Buckwheat No. 2 (rice)	9.38	9.72	9.66	8.35	8.61	8.53
Buckwheat No. 3 (barley)	7.63	7.53	7.57	7.10	7.12	7.12
Buckwheat No. 4	5.51	5.69	5.57	5.38	5.06	5.26
Buckwheat No. 5	5.39	4.84	5.36	4.42	4.05	4.31
Other [2]	3.00	2.97	2.98	3.43	3.45	3.44
Total buckwheat No. 1 and smaller	5.91	7.45	6.66	5.90	6.44	6.19
Total all sizes	8.65	8.99	8.80	7.34	8.07	7.75
	Wyoming region [3]			Total		
Lump [1] and broken	$12.39	$12.38	$12.39	$12.39	$12.38	$12.39
Egg	13.12	13.13	13.12	13.01	12.54	12.99
Stove	12.57	12.61	12.58	12.39	12.00	12.25
Chestnut	12.43	12.58	12.51	12.20	12.14	12.17
Pea	10.28	10.77	10.62	9.72	10.17	10.02
Total pea and larger	12.31	11.79	12.09	11.97	11.42	11.70
Buckwheat No. 1	8.97	9.53	9.34	8.94	9.08	9.03
Buckwheat No. 2 (rice)	9.30	9.48	9.42	8.77	9.14	9.03
Buckwheat No. 3 (barley)	7.37	7.51	7.42	7.30	7.27	7.28
Buckwheat No. 4	6.04	5.54	5.82	5.54	5.30	5.45
Buckwheat No. 5	5.04	5.17	5.08	4.78	4.21	4.64
Other [2]	----	1.80	1.80	3.27	2.69	2.86
Total buckwheat No. 1 and smaller	7.68	6.46	6.91	6.29	6.63	6.48
Total all sizes	10.50	8.53	9.46	8.66	8.38	8.51

[1] Quantity of lump included is insignificant.
[2] Includes various mixtures of buckwheat Nos. 2 to 5 and coal of relatively low dollar value.
[3] Includes Sullivan County.

Table 24.—Average sales realization per net ton of Pennsylvania anthracite at preparation plants, by regions and sizes

(Excludes dredge coal)

Size	Lehigh region					Schuylkill region				
	1961	1962	1963	1964	1965	1961	1962	1963	1964	1965
Lump [1] and broken	$11.29	----	----	----	----	$10.96	$11.34	$12.62	$13.76	----
Egg	10.79	$11.02	$11.75	$13.04	$12.95	10.39	11.01	11.81	12.92	$12.65
Stove	11.14	11.46	12.28	13.41	12.62	10.69	10.93	11.92	12.59	11.73
Chestnut	11.52	11.77	12.39	13.44	12.50	10.80	10.97	11.86	12.52	11.68
Pea	9.22	9.36	9.89	11.06	10.09	8.66	8.80	9.63	10.18	9.37
Total pea and larger	10.75	10.92	11.57	12.78	12.01	10.19	10.36	11.28	11.95	11.11
Buckwheat No. 1	8.24	8.03	8.76	9.68	9.28	7.99	8.09	8.78	9.42	8.69
Buckwheat No. 2 (rice)	8.99	8.80	9.25	10.00	9.66	7.94	7.99	8.63	8.99	8.53
Buckwheat No. 3 (barley)	6.89	6.68	6.74	7.21	7.57	6.62	6.54	6.67	6.87	7.12
Buckwheat No. 4	4.88	4.94	4.97	5.33	5.57	4.76	4.58	4.70	4.98	5.26
Buckwheat No. 5	4.70	4.94	4.86	5.17	5.36	4.21	4.16	4.12	4.43	4.31
Other [2]	1.86	2.02	3.00	3.16	2.98	2.99	3.45	3.25	3.37	3.44
Total buckwheat No. 1 and smaller	6.10	5.45	5.89	6.85	6.66	5.82	5.95	6.16	6.25	6.19
Total all sizes	7.98	7.48	7.81	9.19	8.80	7.51	7.68	8.12	8.28	7.75
	Wyoming region [3]					Total				
Lump [1] and broken	$11.50	$11.06	$11.72	$12.42	$12.39	$11.29	$11.18	$12.10	$12.84	$12.39
Egg	11.08	11.21	12.19	12.90	13.12	10.84	11.13	12.03	12.94	12.99
Stove	11.57	11.59	12.42	13.06	12.58	11.10	11.29	12.19	12.92	12.25
Chestnut	11.96	11.98	12.62	13.18	12.51	11.36	11.49	12.24	12.92	12.17
Pea	10.87	10.60	10.83	11.42	10.62	9.65	9.63	10.15	10.82	10.02
Total pea and larger	11.51	11.42	12.06	12.67	12.09	10.80	10.90	11.65	12.38	11.70
Buckwheat No. 1	9.34	8.86	9.51	10.04	9.34	8.55	8.39	9.06	9.69	9.03
Buckwheat No. 2 (rice)	9.24	8.95	9.41	9.73	9.42	8.55	8.47	9.00	9.43	9.03
Buckwheat No. 3 (barley)	7.15	6.77	6.53	6.93	7.42	6.83	6.64	6.64	6.95	7.28
Buckwheat No. 4	5.15	5.30	5.60	5.22	5.82	4.85	4.78	4.90	5.10	5.45
Buckwheat No. 5	4.90	4.61	4.77	4.95	5.08	4.43	4.41	4.44	4.66	4.64
Other [2]	2.18	2.22	1.92	1.87	1.80	2.64	2.62	2.94	2.88	2.86
Total buckwheat No. 1 and smaller	7.41	6.94	7.46	6.97	6.91	6.32	6.14	6.43	6.56	6.48
Total all sizes	9.54	9.26	9.94	9.82	9.46	8.26	8.19	8.64	8.93	8.51

[1] Quantity of lump included is insignificant.
[2] Includes various mixtures of buckwheat Nos. 2 to 5 and coal of relatively low dollar value.
[3] Includes Sullivan County.

Table 25.—Average value per net ton of Pennsylvania anthracite from all sources, by regions [1]

Region	1964				1965			
	Shipped by rail	Shipped by truck	Colliery fuel	Total	Shipped by rail	Shipped by truck	Colliery fuel	Total
Lehigh	$8.84	$9.56	$9.08	$9.19	$8.65	$8.99	$8.88	$8.80
Schuylkill	7.47	8.30	8.20	7.88	6.68	7.90	7.71	7.33
Wyoming [2]	10.81	8.85	1.63	9.62	10.50	8.53	1.54	9.24
Total	8.71	8.70	2.42	8.65	8.25	8.28	2.31	8.21

[1] Value given for shipments is that at which coal left possession of producing company and does not include selling expenses.
[2] Includes Sullivan County.

EMPLOYMENT

Reports submitted to the Bureau on mine injuries and employment indicated that the average number of men working daily in 1965 dropped 15 percent below the 1964 level, totaling only 11,132.

Of the total working daily in 1965, 41 percent were employed at underground mines, 14 percent in surface work at underground operations (including general shops), 21 percent at strip pits, 18 percent at preparation plants, 5 percent at culm banks, and 1 percent on dredges. With the drop in production from each source, the average number of men also fell for each classification. Employment at deep mines (underground plus surface employees) decreased 13 percent; at strip pits, 24 percent; at preparation plants, 15 percent; reclaiming culm banks, 1 percent; and at river-dredging operations, 10 percent.

Of the total labor force, 49 percent were employed in the Schuylkill region, 37 percent in the Wyoming, and 14 percent in the Lehigh. Employment declined in each region as follows: Lehigh and Schuylkill, each 18 percent and the Wyoming, 11 percent. The four major producing counties, Luzerne, Schuylkill, Northumberland, and Lackawanna, provided work for 92 percent of the labor force; however, employment was down 12 percent in Luzerne County, 20 percent in Northumberland, 16 percent in Schuylkill, and 15 percent in Lackawanna County.

Anthracite operations were active an average of 204 days in 1965—10 less than in 1964. In the Wyoming region, operations were active an average of 214 days; in the Schuylkill region, 192 days; and, in the Lehigh region, 217 days. The reduced labor force worked a total of 2,271,000 man-days. The productivity rate reached a record high of 6.55 tons per man-day, compared with 6.11 tons in 1964. The labor force is shown by counties in table 26. Details on the number of men employed, days worked, man-days of labor, and productivity rates are presented in table 27.

Table 26.—Men employed at operations producing Pennsylvania anthracite, by counties

(Includes operations of strip contractors)

County	1964	1965
Berks, Lancaster, Lebanon, and Snyder	96	82
Carbon	258	224
Columbia	456	355
Dauphin	179	166
Lackawanna	1,107	942
Luzerne	4,605	4,052
Northumberland	1,881	1,498
Schuylkill	4,537	3,793
Sullivan	20	17
Susquehanna	-----	3
Wayne	5	-----
Total	13,144	11,132

Table 27.—Men employed, days, worked, man-days of labor, and output per man-day at operations producing Pennsylvania anthracite in 1965

(Includes operations of strip contractors)

	Lehigh region	Schuylkill region	Wyoming region [1]	Total 1965	Total 1964
Average number of men working daily:					
Underground	80	2,264	2,157	4,501	5,193
In strip pits	756	1,067	526	2,349	3,075
At culm banks	169	236	161	566	574
At preparation plants	490	1,062	495	2,047	2,413
Other surface	50	688	834	1,572	1,781
Total excluding dredge operations	1,545	5,317	4,173	11,035	13,036
Dredge operations	------	97	------	97	108
Total	1,545	5,414	4,173	11,132	13,144
Average number of days active:					
All operations except dredges	217	191	214	204	214
Dredge operations	------	247	------	247	245
Average, all operations	217	192	214	204	214
Man-days of labor:					
All operations except dredges	335,745	1,016,910	894,635	2,247,290	2,785,403
Dredge operations	------	23,912	------	23,912	26,451
Total, all operations	335,745	1,040,822	894,635	2,271,202	2,811,854
Average tons per man-day:					
All operations except dredges	8.83	6.54	5.09	6.30	5.92
Dredge operations	------	29.29	------	29.29	26.66
Average, all operations	8.83	7.06	5.09	6.55	6.11

[1] Includes Sullivan County.

DISTRIBUTION

Reports submitted voluntarily to the Bureau of Mines by producers, wholesalers, and exporting firms showed that 14,285,000 net tons of Pennsylvania anthracite was shipped during the 1964–65 coal year (April 1 to March 31). Where possible, high-ash coal of low dollar value, used largely as colliery fuel or for generation of electricity, was eliminated from the statistics. Of the total shipped to market during the year, 85 percent was destined to points in the United States, 4 percent to Canada, and the remainder to overseas countries. Compared with the 1963–64 coal year, total shipments decreased 9 percent, with an increase of 4 percent in the United States and decreases of 23 percent in exports to Canada, and 52 percent overseas. The abrupt decrease in shipments to overseas destinations was because of a sharp curtailment in the demand for anthracite in Western Europe.

Shipments of pea and larger sizes declined 12 percent and the buckwheat No. 1 and smaller size group, 6 percent. In the United States, demand for pea and larger sizes was 4 percent below 1963–64 coal year levels but shipments of smaller sizes showed an increase of 9 percent. In the Canadian market, buckwheat No. 3 (barley) was the only size to show an increase (7 percent). Canadian receipts of pea and larger sizes decreased 30 percent; those of buckwheat Nos. 1 and 2 and "other", combined, decreased 23 percent. In overseas markets, which included shipments to the U.S. Armed Forces in West Germany, exports of chestnut and larger sizes were 16 percent lower than in the 1963–64 coal year; however, exports of pea and smaller sizes dropped even more—85 percent. The sharp decrease to western Europe was due to relatively warm weather, imports from other countries, and increased competition from other fuels.

Because of the 20 percent decrease in rail traffic and the 6 percent increase in reported truck shipments, rail shipments accounted for 52 percent in the 1964–65 coal year. However, truck shipments rose from 42 percent to 48 percent of the total shipped in the 1964–65 coal year. Data on the distribution of anthracite during the 1964–65 coal year are summarized in table 29.

According to data released by the Pennsylvania Department of Mines and Mineral Industries, both rail and truck shipments declined by 14 percent and 13 percent, respectively, in calendar year 1965. Rail shipments to the New England States, New York, Pennsylvania, Delaware, Maryland, the District of Columbia, Ohio, and Wisconsin all decreased, whereas shipments to other States increased from 2 percent for New Jersey to 214 percent for Virginia. The decline in exports to Canada amounted to 49,000 tons, and exports to other countries were off 274,000 tons, chiefly because of the decrease in shipments to Europe. Shipments by truck to markets in the producing region decreased 16 percent, and those in Pennsylvania markets outside the producing region decreased 8 percent. The District of Columbia was the only trucking market showing an increase. Truck data for 1965 are shown by months in table 28. Rail and truck shipments for the same period, 1961–65, are shown in tables 30 and 31.

The tonnage of anthracite moving over Lake Erie docks increased from 217,000 net tons in 1964 to 224,000 tons in 1965, but that moving over Lake Ontario docks decreased 4,000 tons. Receipts were 24,000 tons less at Duluth-Superior. At Upper Lake docks, receipts increased about 3,000 tons at Lake Michigan, but there were no receipts at Lake Superior. The ex-dock movement to inland points decreased 96 percent on Lake Superior and 7 percent on Lake Michigan. Detailed data on the Lake-dock trade in Pennsylvania anthracite are shown in table 3.

Table 28.—Truck shipments of Pennsylvania anthracite in 1965, by months, and by State of destination, in net tons [1]

Destination	January	February	March	April	May	June	July
Pennsylvania:							
Within region	321,545	294,161	300,777	245,525	175,940	185,222	147,304
Outside region	304,844	332,484	264,846	241,239	189,020	213,487	235,299
New York	51,678	55,908	51,652	39,814	31,602	37,968	32,704
New Jersey	46,282	41,296	40,092	35,499	31,877	45,053	24,141
Delaware	3,814	3,404	2,846	1,739	2,514	1,766	789
Maryland	8,761	7,041	6,293	3,271	1,959	2,269	3,043
District of Columbia	1,424	1,343	1,091	299	114	55	100
Other States	2,612	2,819	1,757	1,350	1,613	1,557	1,434
Total:							
1965	740,960	738,456	669,354	568,736	434,639	487,377	444,814
1964	873,834	785,719	627,555	656,380	599,853	624,000	446,671

Destination	August	September	October	November	December	Total	Percent of total trucked
Pennsylvania:							
Within region	143,575	159,561	196,918	248,042	293,563	2,712,133	39.8
Outside region	200,411	243,858	239,457	254,629	294,934	3,014,508	44.3
New York	42,892	39,124	40,151	43,276	54,561	521,330	7.7
New Jersey	30,321	30,964	35,071	33,409	46,231	440,236	6.5
Delaware	2,282	2,037	3,063	2,732	2,963	29,949	.4
Maryland	4,018	5,680	6,126	6,836	7,741	63,038	.9
District of Columbia	157	418	651	662	586	6,900	.1
Other States	1,615	995	2,794	2,528	2,439	23,513	.3
Total:							
1965	425,271	482,637	524,231	592,114	703,018	6,811,607	100.0
1964	591,221	631,814	627,051	587,023	810,736	7,861,857	100.0

[1] Compiled from reports of Pennsylvania Department of Mines and Mineral Industries; does not include dredge coal.

Table 29.—Distribution of Pennsylvania anthracite, April 1, 1964, to March 31, 1965, by States, Provinces, and countries of destination, in net tons

Destination	Pea and larger					Buckwheat No. 1 and smaller					Total all sizes	Percent of total
	Broken and egg	Stove	Chestnut	Pea	Total	Buckwheat No. 1	Buck-wheat No. 2 (rice)	Buck-wheat No. 3 (barley)	Other	Total		
United States:												
New England States:												
Connecticut	929	18,260	22,861	836	42,886	2,274	5,243	15,331	478	23,326	66,212	0.4
Maine	533	17,812	15,919	399	34,663	3,437	8,844	2	11	12,294	46,957	.3
Massachusetts	7,487	88,167	46,061	7,410	149,125	19,525	27,905	1	113	47,544	196,669	1.4
New Hampshire	226	11,654	7,442	667	19,989	2,506	5,896	8	90	8,500	28,489	.2
Rhode Island	221	5,388	5,466	383	11,458	3,189	1,054		13	4,256	15,714	.1
Vermont	499	15,502	9,620	2,255	27,876	10,262	14,126			24,388	52,264	.4
Total	9,895	156,783	107,369	11,950	285,997	41,193	63,068	15,342	705	120,308	406,305	2.8
Middle Atlantic States:												
New Jersey	4,217	105,029	247,385	74,080	430,711	116,306	129,121	162,977	317,126	725,530	1,156,241	8.1
New York	19,940	308,016	261,633	414,269	1,003,858	304,437	178,649	260,730	283,713	1,027,529	2,031,387	14.2
Pennsylvania [1]	38,985	556,174	1,082,903	870,845	2,548,907	1,037,075	1,011,614	1,319,952	1,412,227	4,780,868	7,329,775	51.3
Total	63,142	969,219	1,591,921	1,359,194	3,983,476	1,457,818	1,319,384	1,743,659	2,013,066	6,533,927	10,517,403	73.6
South Atlantic States: [2]												
Delaware	4,553	9,792	20,421	711	35,477	1,345	2,550	5,045	43	8,983	44,460	.3
District of Columbia	451	10,081	9,606	726	20,864	4,850	753	964		6,567	27,431	.2
Maryland	298	35,994	26,175	3,143	65,610	16,207	2,738	30	281,030	300,005	365,615	2.6
Virginia	82	5,979	2,868	3,856	12,785	815	312	4	3,333	4,464	17,249	.1
Total	5,384	61,846	59,070	8,436	134,736	23,217	6,353	6,043	284,406	320,019	454,755	3.2
Lake States: [3]												
Illinois		1,352	2,572	210	4,134	30,789	9,547	3,479	47,228	91,043	95,177	.7
Michigan		10,605	2,259	225	13,089	7,994	4,330	28	112,569	124,921	138,010	1.0
Minnesota		68	278	57	403	5	2	4	20,932	20,943	21,346	.1
Ohio	26	1,754	2,747	1,625	6,152	29,835	10,334	9,384	115,720	165,273	171,425	1.2
Wisconsin		7,307	9,493	985	17,785	2,295	1,241	42	8,992	12,570	30,355	.2
Total	26	21,086	17,349	3,102	41,563	70,918	25,454	12,937	305,441	414,750	456,313	3.2
Other States	1,741	208	6,014	13,407	21,370	45,859	6,745	28,342	222,154	303,100	324,470	2.3
Total United States	80,188	1,209,142	1,781,723	1,396,089	4,467,142	1,639,005	1,421,004	1,806,323	2,825,772	7,692,104	12,159,246	85.1
Canada:												
Ontario	1,512	130,982	102,735	21,350	256,579	56,988	19,198	5,398	1,247	82,831	339,410	2.4
Quebec	255	21,859	14,432	889	37,435	19,729	5,681	94,138	427	119,975	157,410	1.1
Other Provinces	436	3,380	2,761	6	6,583	73	957	9	1,937	2,976	9,559	.1
Total Canada	2,203	156,221	119,928	22,245	300,597	76,790	25,836	99,545	3,611	205,782	506,379	3.6
Other countries	336,379	653,471	376,590	100,426	1,466,866	83,349	7	5,631	63,549	152,536	1,619,402	11.3
Grand total	418,770	2,018,834	2,278,241	1,518,760	6,234,605	1,799,144	1,446,847	1,911,499	2,892,932	8,050,422	14,285,027	100.0

[1] Includes "Local Sales"
[2] Shipments to other States in the South Atlantic area are included in "Other States".
[3] Shipments to Indiana are included in "Other States".

Table 30.—Rail shipments of Pennsylvania anthracite, by destinations, in net tons [1]

Destination	1961	1962	1963	1964	1965
New England States	602,262	465,535	407,194	381,380	297,679
New York	2,267,861	1,939,004	1,515,786	1,317,443	1,055,689
New Jersey	826,323	858,587	675,159	640,969	654,031
Pennsylvania	2,275,481	2,309,182	2,001,932	2,209,434	1,779,815
Delaware	42,194	21,373	16,630	12,002	6,302
Maryland	255,658	182,222	207,904	230,209	184,048
District of Columbia	19,561	15,983	14,982	19,008	11,889
Virginia	14,158	18,876	10,613	12,373	38,889
Ohio	174,620	165,211	138,546	162,154	142,136
Indiana	46,650	29,754	26,306	72,358	79,845
Illinois	76,348	75,435	77,548	102,438	120,683
Wisconsin	59,815	41,322	24,562	29,408	20,975
Minnesota	8,636	6,304	8,394	21,492	39,448
Michigan	55,218	43,028	35,377	50,964	84,266
Other States	121,119	190,028	217,351	231,842	272,459
Total United States	6,845,904	6,361,844	5,378,284	5,493,474	4,788,154
Canada	890,058	713,336	647,437	513,061	463,586
Other foreign countries	82,636	516,376	1,953,671	1,443,751	1,170,179
Grand total	7,818,598	7,591,556	7,979,392	7,450,286	6,421,919

[1] Compiled from reports of Pennsylvania Department of Mines and Mineral Industries; does not include dredge coal.

Table 31.—Truck shipments of Pennsylvania anthracite, by destinations, in net tons [1]

Destination	1961	1962	1963	1964	1965
Pennsylvania:					
Within region	3,744,781	3,471,725	3,227,838	3,231,333	2,712,133
Outside region	2,891,607	2,915,220	3,155,875	3,284,221	3,014,508
New York	1,194,765	844,447	870,186	691,987	521,330
New Jersey	641,329	591,905	547,333	500,921	440,236
Delaware	45,310	43,863	37,465	34,019	29,949
Maryland	92,837	92,249	89,995	78,227	63,038
District of Columbia	5,753	6,573	4,443	5,079	6,900
Other States	26,169	32,214	36,971	36,070	23,513
Total	8,642,551	7,998,196	7,970,106	7,861,857	6,811,607

[1] Compiled from reports of Pennsylvania Department of Mines and Mineral Industries; does not include dredge coal.

CONSUMPTION

Apparent consumption of Pennsylvania anthracite in the United States in 1965, calculated as production minus exports, including that exported to West Germany for use of U.S. Armed Forces, totaled 12.9 million net tons—a loss of 10 percent. Although use data on anthracite are incomplete, the larger part of the loss was attributable to the continued decline for the space-heating sizes. Demand by the major European countries for imports of Pennsylvania anthracite declined drastically (see table 34). Exports to Canada showed a slight increase (6,000 tons), but deliveries by United States retail dealers outside the producing region were 6 percent below the 1964 volume.

Consumption of Pennsylvania anthracite at electric-utility plants decreased 4 percent. Data for the iron and steel industry are incomplete, as no data are available for "miscellaneous" purposes. Anthracite used for coke making increased 15,000 tons; however, that used for sintering and pelletizing decreased 48,000 tons. (Consumption at cement plants rose 116,000 tons, while the amount used as colliery fuel decreased slightly (1,000 tons).

Consumption of Pennsylvania anthracite by public utility and coke plants is shown by months in table 3. Apparent consumption of anthracite, heating and range oil, and natural gas is shown in table 32 for the individual States comprising the primary anthracite marketing area. Historical data on retail-dealer deliveries, and consumption for certain industrial purposes are presented in table 33.

Table 32.—Apparent consumption of anthracite, heating and range oil, and natural gas, in the principal anthracite markets

(Thousand net tons)

Fuel	New England	New York	New Jersey	Pennsylvania	Delaware	Maryland	District of Columbia	Total	Percent of total fuels
Anthracite (all users):[1]									
1962	466	[2] 2,783	[2] 1,451	8,696	65	274	23	13,758	9.3
1963	407	[2] 2,386	[2] 1,223	8,386	54	298	19	12,773	8.6
1964	381	[2] 2,009	[2] 1,142	8,725	46	309	24	12,636	8.5
1965	298	[2] 1,577	[2] 1,094	7,527	36	247	19	10,798	6.7
Oil (heating and range):[3]									
1962	32,891	32,294	12,076	12,433	1,003	4,442	1,092	96,231	64.8
1963	31,783	32,154	12,829	12,519	1,148	4,506	1,167	96,106	64.4
1964	31,432	30,988	12,851	12,484	934	4,692	1,498	94,879	63.7
1965	34,950	36,670	13,469	13,123	975	4,534	2,173	105,894	66.2
Natural gas:[4]									
1962	4,298	13,590	4,551	12,685	228	3,086	(5)	38,438	25.9
1963	4,611	14,290	4,897	12,992	249	3,218	(5)	40,257	27.0
1964	4,850	14,499	5,303	13,080	262	3,397	(5)	41,391	27.8
1965	5,129	15,465	5,565	13,359	289	3,568	(5)	43,375	27.1
Total:									
1962	37,655	48,667	18,078	33,814	1,296	7,802	[6] 1,115	148,427	100.0
1963	36,801	48,830	18,949	33,897	1,451	8,022	[6] 1,186	149,136	100.0
1964	36,663	47,496	19,296	34,289	1,242	8,398	[6] 1,522	148,906	100.0
1965	40,377	53,712	20,128	34,009	1,300	8,349	[6] 2,192	160,067	100.0

[1] Pennsylvania Department of Mines and Mineral Industries.
[2] Part of the anthracite shown as shipped to New Jersey is reshipped to New York.
[3] Converted to coal equivalent upon the basis of 4 barrels of fuel oil equaling 1 ton of coal.
[4] Converted to coal equivalent upon the basis of 24,190 cubic feet of natural gas equaling 1 ton of coal.
[5] District of Columbia included with Maryland.
[6] Natural gas for the District of Columbia included with Maryland.

Table 33.—Retail dealer deliveries and consumption of Pennsylvania anthracite in the United States, 1955–65, by selected consumer categories

(Thousand net tons)

Year	Retail dealer deliveries [1]	Colliery fuel	Railroads [2]	Electric utilities [3]	Briquet plants	Cement plants	Iron and steel industry: Coke making	Iron and steel industry: Sintering and pelletizing [4]	Iron and steel industry: Other [5]
1955	13,019	419	457	3,209	264	199	366	385	443
1956	13,018	342	409	3,296	228	244	377	564	625
1957	10,670	279	361	3,363	156	221	389	868	698
1958	9,386	195	335	2,786	120	183	255	685	686
1959	7,562	129	292	2,629	43	159	369	780	683
1960	6,775	102	248	2,751	31	152	370	754	720
1961	5,070	45	NA	2,509	28	153	320	588	685
1962	4,767	152	NA	2,297	(6)	188	420	560	609
1963	4,055	161	NA	2,155	(6)	184	451	766	670
1964	3,334	144	NA	2,239	(6)	153	492	1,014	NA
1965	3,126	143	NA	2,158	(6)	269	507	966	NA

NA Not available.
[1] Estimated from reports submitted by a selected list of retail dealers. Does not include local sales.
[2] Association of American Railroads.
[3] Federal Power Commission.
[4] Annual Statistical Report, American Iron and Steel Institute.
[5] Annual Statistical Report, American Iron and Steel Institute. Contains a small but not exactly determined amount of anthracite used for sintering.
[6] Concealed to avoid disclosure of individual company data.

STOCKS

Monthly data on stocks held in retail yards showed a definite tendency among retailers to operate with lower inventories. With the exception of January, when stocks were 38,000 tons over the same month of 1964, retail dealers operated throughout 1965 with less stocks. At the end of December, Bureau estimates placed the quantity of anthracite held by retail dealers outside the producing region at 81,000 tons under the amount in inventory at the end of 1964.

Public utilities again decreased their stocks—by 160,000 tons. At the close of the year the utilities reported stocks of 1,088,000 tons, 13 percent below the 1964 yearend figure. Coke plants increased their stocks by 4 percent. Stocks on the Upper Lake docks increased at Lake Michigan docks by 28 percent but at Lake Superior docks stocks were down to zero.

FOREIGN TRADE

Data released by the Bureau of the Census, U.S. Department of Commerce, indicate that 851,000 net tons of Pennsylvania anthracite was exported in 1965, a decrease of 46 percent from 1964. The entire loss was attributable to the decrease in exports to Western Europe, as minor gains in shipments to North and South America and Oceania were offset by declines in exports to Africa and Asia.

Census export data in table 34 show that 134,000 tons of anthracite were shipped to Europe in 1965, a decrease of 84 percent from the 1964 figure. However, this does not fully reflect the movement of anthracite to the Continent, because the Bureau of the Census does not include in its figures coal shipped abroad for the use of U.S. Armed Forces. According to data furnished to the Bureau of Mines by the Association of American Railroads, 965,900 tons were dumped at tidewater piers for West Germany and 167,500 tons were consigned to Netherlands. Of this amount approximately 1,130,000 tons were intended for use of U.S. Armed Forces in Germany. A more accurate measure of the importance of the export trade to the industry can be obtained, therefore, by adding this military tonnage to the Bureau of the Census data. Such an addition would show that about 1,264,000 tons were shipped to Europe. Also, the figure for total exports would approximate 1,981,000 tons.

Although size data are not available by calendar years, trade sources indicated the major part of the export market in 1965 consisted of the larger sizes, thus helping the industry to absorb further losses in the space-heating markets of the United States and Canada.

As indicated in footnote 4 of table 1, the Bureau of the Census discontinued issuing separate data on imports of anthracite beginning with September 1963. Since that date, the small quantities imported into the country have been combined with bituminous coal.

Table 34.—Anthracite exported from the United States, by countries and customs districts

(Net tons)

Country	1964	1965
North America:		
Canada	636,867	642,657
Costa Rica	---	61
Dominican Republic	76	---
Haiti	37	---
Honduras	---	19
Jamaica	46	95
Mexico	7,712	8,921
Netherlands Antilles	---	417
Nicaragua	---	13
Panama	---	219
Trinidad and Tobago	69	110
Total	644,807	652,512
South America:		
Argentina	4,424	5,084
Brazil	1,701	2,089
British Guiana	---	45
Chile	387	397
Colombia	341	429
Peru	32	---
Surinam	36	1,983
Venezuela	6,722	9,596
Total	13,643	19,623
Europe:		
Belgium-Luxembourg	140,486	30,816
Denmark	54	93
France	291,796	29,883
Germany, West	679	92
Greece	---	144
Italy	208,313	39,093
Netherlands	201,071	3,040
Norway	---	72
Spain	19,183	29,105
United Kingdom	439	1,277
Total	862,021	133,615
Africa:		
Kenya	565	---
Rhodesia and Malawi	43	---
Tunisia	---	56
Total	608	56
Asia:		
India	2,268	5,110
Indonesia	77	913
Iran	39	---
Israel	8,385	168
Japan	11,351	---
Korea, Republic	47	---
Malaysia	---	359
Pakistan	49	---
Philippines	120	818
Saudi Arabia	30	---
Taiwan	---	19
Thailand	---	2,120
Turkey	---	62
Viet-Nam	29,385	30,185
Total	51,751	39,754
Oceania:		
Australia	2,267	4,991
New Zealand	---	79
Total	2,267	5,070
Grand total	1,575,097	850,630

Customs district	1964	1965
North Atlantic:		
Maine and New Hampshire	50	125
New York	4,011	6,697
Philadelphia	1,095,655	371,324
South Atlantic:		
Georgia	---	19
Maryland	712	256
Virginia	533	14,026
Gulf Coast:		
Galveston	3,313	8,231
New Orleans	1,375	3,003
Mexican border: Laredo	7,347	8,921
Northern border:		
Buffalo	328,511	327,168
Duluth and Superior	2,077	420
Michigan	1,950	2,146
Montana and Idaho	---	19,060
Ohio	3,073	---
Rochester	5,501	1,258
St. Lawrence	119,849	85,828
Vermont	870	1,020
Wisconsin	---	1,062
Pacific Coast: Washington	270	66
Total	1,575,097	850,630

Source: Bureau of the Census.

NOTE.—According to the Association of American Railroads 1,246,261 net tons of anthracite was exported to Europe during 1965 compared with 2,005,763 tons for 1964. Of this total 1,133,409 tons was consigned to West Germany and Netherlands, including exports to U. S. military forces. This compares with 1,362,189 tons for 1964.

WORLD PRODUCTION

World production of anthracite totaled 208.9 million tons in 1965, according to estimates and data reported by several sources, a decrease of less than 1 percent from the revised figure for 1964. The only country showing an increase in Europe was Spain, with a gain of 105,000 tons in production. It was estimated that North Korea increased production 4.1 million tons; China, 1.2 million tons; South Korea, 700,000 tons; North Viet-Nam 200,000 tons; and the U.S.S.R., 95,000 tons. Production in the United States decreased by 2.3 million tons. World production of anthracite for the period, 1961–65, is shown in table 35.

Table 35.—World production of anthracite, by countries [1]
(Thousand short tons)

Country	1961	1962	1963	1964	1965 p
Belgium	8,210	8,406	8,562	8,710	7,934
Bulgaria	210	217	239	e 220	e 190
China, Mainland e	22,000	22,000	22,000	23,100	24,300
France	12,849	12,942	11,998	r 13,511	e 11,000
Germany:					
East e	275	275	275	275	275
West	13,803	14,351	14,969	16,217	15,526
Ireland	r 150	146	r 164	160	e 130
Italy	26	r 19	15	10	7
Japan	2,088	2,065	1,982	1,884	1,797
Korea:					
North e	8,300	9,900	10,700	12,300	16,400
South	6,486	8,206	9,764	10,605	11,296
Morocco	452	408	445	441	241
Netherlands e	4,400	4,400	4,300	4,300	4,300
New Zealand	(2)	1	(2)	(2)	(2)
Peru	23	24	r 11	34	7
Portugal	518	446	459	489	472
Rumania e	17	17	17	17	17
South Africa, Republic of	1,429	1,224	1,270	1,449	1,374
Spain	2,863	2,913	3,057	r 2,954	3,059
U.S.S.R.	85,405	84,175	84,530	r 86,905	e 87,000
United Kingdom	3,973	4,371	4,658	5,150	4,705
United States (Pennsylvania)	17,446	16,894	18,267	17,184	14,866
Viet-Nam					
North	3,118	3,823	r 3,689	e 3,700	e 3,900
South	63	78	115	r 85	83
World total (estimate) [1]	194,100	197,300	201,500	209,700	208,900

e Estimate. p Preliminary. r Revised.
[1] Data do not add to totals shown because of rounding where estimated figures are included in the detail.
[2] Less than ½ unit.
NOTE.—An undetermined amount of semianthracite is included in the figures for some countries.

TECHNOLOGY

Mining.—The Bureau's underground hydraulic mining tests were completed in April 1965.[3] The work involved a one-half replicate, designed experiment to determine the principal effects and interactions of seven factors at two levels. The following factors were considered: Line pressure, water volume at face, depth of cut, number of mast setups, rate of nozzle travel, cutting pattern, and angle of jet impact. To conduct the investigation, 64 separate,

[3] Buch, J. W. Hydraulic Mining of Anthracite: Engineering Development Studies. BuMines Rept. of Inv. 6610, 1965, 24 pp.

complete face advances were required. In addition, cutting tests were made with selected variables to measure the validity of a prediction equation over a practical range of volumes and pressures. An analysis of the data will be published upon completion of the factorial evaluations.

Preparation.—A determination of the washability characteristics of major anthracite seams with substantial minable reserves, begun in 1964, was continued by the Bureau during the year to assist in developing processes for converting anthracite into new products. In the first phase of this study, seven samples from different mines were washed and tested by float-and-sink methods to determine the characteristics of the Bottom Red Ash seam in the Northern anthracite field. Total thickness of the seam ranges from 7 feet to 12 feet 4 inches; slate and bony partings number between 2 and 11, and are 6 to 40 inches thick; the coal layers range from 61 to 104 inches thick.

Differences in geologic structure affect the amount of coal containing 11 percent or less ash that could be recovered from each mine, but these differences had little effect on quality. The arbitrary value used as a basis for comparing yields of fuel-grade coal was 11 percent ash. Recovery of 3/14- by ½-inch coal, washing at specific gravities of 1.70 to 1.90, ranged from 67 to 95 percent; recovery from ½-inch by 30-mesh samples followed a similar pattern, ranging from a low of 73 to a high of 96 percent. Two samples washed at specific gravities of 1.55 or lower, contained substantial quantities of coal with 5 percent or less ash at yields of 46 to 58 percent. Proximate analyses, a major criteria of quality for market-grade coal, were comparable for all sizes studied. Volatile matter ranged from 4.7 to 6.0 percent, fixed carbon from 82 to 86 percent, and ash from 8 to 12 percent. Crushing the 3½- by ½-inch anthracite to ½-inch by 30-mesh size substantially increased the yield of float coal at a specific gravity of 1.50, containing less than 5 percent ash in five of the seven samples. Only in one sample was the overall yield of 11-percent-ash coal increased substantially by crushing.

In the second phase of the program, an examination was completed of three of seven samples collected from the Bottom Ross seam, also in the Northern anthracite field. Coals containing comparable ash percentages from different locations in the same seam had significantly different grindabilities and specific gravities. In all cases, grindability indexes of specific gravity fractions that were separated from a given sample increased with the ash content.

Properties.—Basic information was obtained on the structural features of anthracite from surface-area measurements to two anthracites by means of carbon dioxide adsorption.[4] The purpose of this work was to determine whether anthracites differ in specific surface area and if their pore systems are interconnected or consist predominantly of isolated segments. The results were also desired for correlation with pore-volume data obtained on the same anthracites.

Surface area of the denser anthracite was 9 percent less than that of the lighter one. Specific surface area of 60- to 400-mesh particles was virtually the same, however, indicating that in particles smaller than 60 mesh all pores accessible to carbon dioxide are essentially interconnected. Pores in the denser anthracite were believed to be more constricted because twice as much time was required to degas it than the other sample under comparable conditions. In all cases, the finer anthracites reached equilibrium more rapidly than the coarser particles. Several modifications of the Brunauer-Emmett-Teller (BET) equation and the Langmuir equation were used to calculate the amount of adsorbate required to form a monomolecular layer on the surface under investigation. Of these, the modified Keii-BET equation gave the best agreement between the monolayer volumes and specific pore volumes reported in Report of Investigations 6657. Invariably, monolayer volumes calculated as liquids by the Langmuir equation were significantly greater than specific pore volumes, indicating that Langmuir-type adsorption did not take place.

The surface area of six coals (200 by 325 mesh) was estimated by Walker and Kini[5] from the sorption of nitrogen at 77° K, krypton at 195° K, carbon dioxide at 195°

[4] Ramsey, Jerry W., G. A. Brady, and J. W. Eckerd. Relation of Density and Porosity Data to Structural Features of Anthracite. BuMines Rept. of Inv. 6657, 1965, 24 pp.

[5] Walker, P. L., Jr., and K. A. Kini. Measurement of the Ultrafine Surface Area of Coals. Fuel, v. XLIV, November 1965, pp. 453–459.

K, xenon, at 273° K, and carbon dioxide at 298° K. The coals ranged in carbon content (dry, ash-free basis) from 72.7 to 95.2 percent. Surface areas were calculated from sorption isotherms, allowing 30 minutes for each sorption point, using the BET equation. The sorption system most promising to measure the surface area completely of microfine coals appeared to be carbon dioxide at 298° K. With this system, the surface areas ranged from 224 m^2/g to a low of 104 m^2/g. This minimum in surface area is substantially greater than reported previously, even from methanol sorption at room temperature.

Utilization.—The Bureau of Mines also investigated coal reactions at extremely high temperatures in a search for new ways to convert coal into chemicals. In these studies, high temperatures were provided by a plasma jet, an arclike discharge that creates temperatures up to 15,000° C. Acetylene yields of up to 40 percent of the weight of the feed material were obtained from high-volatile A bituminous coal (moisture and ash free) in an argonhydrogen plasma containing 33 percent hydrogen. High-volatile C bituminous, lignite, and anthracite produced lower yields, in the order listed.

Coal temperatures in these experiments (less than 1,000° C) were low. The temperature was increased to 1,300° to 1,400° C by directing an argon plasma upward into beds of coal consisting of fairly large particles, up to 4 mesh. Similar temperatures were obtained with powdered coal by means of an insulated, preheated graphite-lined reaction zone. Efforts were continued in an effort to develop a workable system that will heat coal to 2,000° C or higher.

In other work involving high-temperature reactions, coals of various ranks were irradiated optically at several thousand degrees in a commercial laser unit to determine yields of chemicals, especially acetylene. Yields of acetylene, hydrogen, carbon monoxide, and carbon dioxide increased progressively with decrease in coal rank from anthracite (high rank) to lignite (low rank). Methane and hydrogen cyanide yields changed little. The presence of argon increased the output of acetylene, with the maximum yield being achieved when the argon pressure was about 100 millimeters. In hydrogen, helium, or stream atmospheres, acetylene yields decreased uniformly in that order.

The Bureau's anthracite-briquet research program is aimed at producing a suitable blast furnace fuel. One hundred seventy-five tons of anthracite briquets was produced in 1965 to complete the 300 tons required for a blast furnace test. The briquets were made in equipment designed to create a product that would compare favorably with coke as a blast furnace fuel. However, continuous calcining is essential to the economic production of a metallurgical briquet from anthracite. On the basis of pilot-plant tests, a gas-fired sintering system is being assembled for continuous tests. Inlet temperature of the furnace will be about 600° F; a temperature of 1,800° F will complete calcination of the briquets as they reach the discharge end. Construction of the system was virtually completed by the end of the year.

Anthracite markets might be increased if an agglomerated product could be made for use as fuel in foundry cupolas. An extruded anthracite fuel with properties similar to coke, for example, could have a decided price advantage. To determine if anthracite mixed with a binder could be successfully extruded into such a fuel, tests were conducted with a 4-inch-diameter extrusion press. These tests failed to produce an acceptable product, since effective extrusion could not be achieved without excessive amounts of binder.

Microfilming.—The program initiated in 1962 by the Bureau to microfilm all available data relating to abandoned anthracite mines was continued during the year. Maps, cross sections, and other related data were recorded for 57 mines. The work involved 1,450 maps and 4,118 photographic frames. Data for 165 mines throughout the anthracite region have been duplicated since the program was initiated. Original film is transferred to Washington for storage, while negative and positive copies are kept on file at the Anthracite Field Office in Wilkes-Barre, Pa. An Information Circular[6] has been published covering that phase of the microfilming program covering the Eastern Middle field.

[6] Whaite, Ralph H. Microfilming Maps of Abandoned Anthracite Mines—Mines of the Eastern Middle Field. BuMines Inf. Cir. 8274, 1965, 18 pp.

Mine Water Control.—Cooperative work with the Commonwealth of Pennsylvania on the control of mine water continued during 1965 under the act of July 15, 1955 (Public Law 162). A surface drainage project was started in the Southern field. In the Northern anthracite field, one deep-well pumping station was completed and work was initiated on a second. The pumping installations were made in abandoned underground mines to protect active mining operations. The surface and deep-well pump installations entailed a total cost of approximately $405,000, of which the Federal Government will pay one-half. It is estimated that these projects will protect the livelihood of about 1,750 mine personnel, and an estimated 83.6 million tons of anthracite reserves.

Subsidence Control.—Four subsidence control projects were completed in the Northern field under the Mine Water Control Act amendment of October 15, 1962 (Public Law, 87–818). These projects were designed to protect inhabitants and surface structures in heavily populated parts of Scranton, Wilkes-Barre, and Plymouth from the hazards of surface subsidence. The combined project areas totaled approximately 131 acres, on which more than 600 dwellings, 5 churches, and 5 schools with an estimated total value of $12.5 million are located. The work, undertaken cooperatively with the Commonwealth of Pennsylvania at a total estimated cost of $2.1 million, included crushing and screening mine refuse piles for backfilling material that was later mixed with water and introduced into the mine voids below the project areas through a series of boreholes. The removal of such refuse material, donated by private owners to the municipalities, not only assisted in eliminating them as unsightly fire hazards but restored the sites for more useful purposes.

A brochure entitled "A Study of Operation Backfill" was prepared for distribution by the Bureau in cooperation with the Commonwealth of Pennsylvania to describe the techniques employed in subsidence-control operations. It is expected that most future subsidence-control projects will be carried out under provisions of the Appalachian Regional Development Act of 1965 (Public Law 89–4), while mine-drainage and flood-control projects will continue to be implemented under the original legislation, since, under the terms of the Appalachian Act, the Federal Government defrays 75 percent of the cost and the States 25 percent.

Appalachian Program.—In 1965, the Appalachian Regional Commission approved seven mine-void filling projects, submitted by the Commonwealth of Pennsylvania, to arrest or alleviate surface subsidences above abandoned anthracite mines. Cost of the seven projects in Pennsylvania is estimated at $6 million. Six of the projects are located in heavily populated sections of Wilkes-Barre and Scranton; the other is at Coaldale. A surface reclamation project in Moraine State Park was also approved by the Commission at a total cost of $140,000. This project is designed to eliminate public health and safety hazards from old surface pits in a public park. Seven abandoned mine-fire control projects, estimated to cost approximately $7.5 million, were also approved by the Commission in 1965. Two of these are anthracite fires and five are bituminous, all in Pennsylvania. Some of the techniques to be employed in this work will include isolating the fire area by constructing incombustible barriers of a sand-water slurry introduced into the mine voids through strategically located boreholes; cutoff trenches backfilled with clay; and, sealing the surface above the fire areas.

Coke and Coal Chemicals

By J. A. DeCarlo [1] and E. T. Sheridan [2]

Contents

GENERAL SUMMARY

The coke industry nearly matched the 8.3-percent gain recorded for total industrial production in 1965 with a 7.6-percent increase in coke output equivalent to almost 5 million tons. Both oven- and beehive-coke plants contributed to the increase, although the percentage increase for oven-coke plants was more than double that of the beehive plants. The upward trend in production that began in the latter part of 1964 continued through most of 1965, although output returned to a more normal level during the last quarter of the year. Production was particularly high in May when the monthly output of oven and beehive coke was nearly 6 million tons. Peak production for oven-coke plants, which supplied 98 percent of the total coke, was in May when output reached 5.8 million tons, the highest monthly output of oven coke since March 1960. Beehive production was highest also in the first part of the year, and the output of 197,100 tons in March was the largest amount of beehive coke produced in any month since April 1957. Both merchant and furnace plants contributed to the increase in total oven-coke production, registering increases of 5 percent and 7 percent, respectively, over their outputs in 1964. Beehive production was 3 percent greater than in 1964.

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[1] Supervisory chemical engineer.
[2] Mineral specialist.

Demand for coke exceeded production during the first half of the year and producers' stocks of oven coke decreased each month through June. In the latter half of the year, stocks increased moderately but steadily each month, and at the end of the year were 37 percent greater than at the first of the year. The quantity of oven and beehive coke on hand was only 2.7 million tons, equivalent to 16.1 days production at the December rate of operation.

Blast furnaces continued to use the bulk of the nation's coke output, receiving 90 percent of the total shipments from producers. A 5-percent increase in blast furnace coke shipments in 1965 was caused partially by a slight increase in the coke rate, which had declined each year since 1952. Most of the increase, however, was caused by a 2.6-million-ton increase in blast-furnace pig iron and ferroalloys output.

The remaining 10 percent of the coke distributed in the United States was consumed principally in foundries and miscellaneous industrial plants for fuel. A small quantity was sold for residential heating, but this market has been declining steadily and is expected to be nonexistent soon. Shipments to foundries were 8 percent greater than in 1964, but shipments to other-industrial plants declined 8 percent.

The overall breeze yield decreased slightly, but production increased 3 percent, principally because of the larger amount of coal carbonized. Unsuitable for most metallurgical applications because of its small size and high ash content, the bulk of the breeze is used by producers for steam raising and for sintering iron ores. However, about one-third of the 1965 production was sold for use mainly as a reductant in electric furnaces that smelt phosphate rock to produce elemental phosphorus. This was about the same percent of the output that was sold in 1964, but the quantity sold was 16 percent greater.

The average unit value of the coals carbonized was higher at both oven- and beehive-coke plants in 1965. A $0.23-per-ton increase in average value at oven plants was caused principally by a $1.99-per-ton increase in the average value of the coals carbonized in Alabama. A $0.09-per-ton increase for beehive plants was due to higher coal costs in all three beehive-coke-producing States.

Production of all basic coal-chemical materials increased in 1965, with tar, ammonia, light oil, and coke-oven gas registering increases ranging between 1 and 8 percent over the quantities produced in 1964. Most of the increases were attributed to the larger quantity of coal carbonized because the overall yields of all products, except coke-oven gas, declined because of the higher operating rates. Although production of crude tar and light oil was substantially higher than in 1964, output of most of the tar and light-oil derivatives did not increase proportionally because some plants discontinued their processing operations.

Prices of most coke-oven products remained at about the same level throughout the year. According to trade journals, prices of oven-foundry and beehive-furnace and -foundry coke remained at about the 1964 level. Prices, f.o.b. plant, ranged from $14.75 to $16.25 for beehive-furnace coke; from $18.00 to $18.50 for beehive-foundry coke; and from $31.00 to $34.50 for oven-foundry coke. Prices of coal chemicals also remained about the same throughout the year, except that the price of benzene increased from $0.25 to $0.26 per gallon in April and then ranged between $0.26 and $0.28 per gallon for the remainder of the year.

Foreign trade in coke was relatively small, but exports were 60 percent greater than in 1964. Canada remained the principal export market, receiving nearly three-fourths of the foreign shipments. Imports were insignificant and were only about one-tenth as large as exports.

The total value of all coals carbonized was $895 million, and the total value of all products of carbonization was $1,465 million. The value of coke and breeze, the principal products, accounted for 79 percent of the total value of all products.

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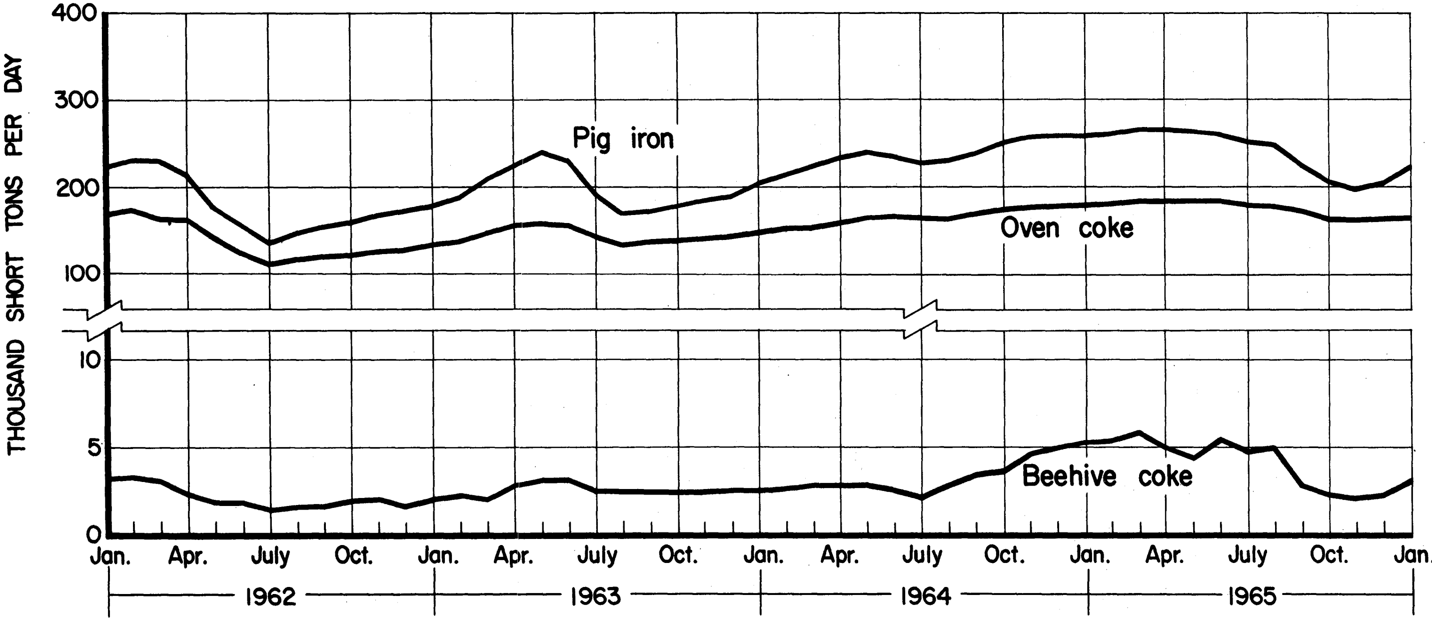

Figure 1.—Average daily production of oven and beehive coke and pig iron in the United States, by month.

Table 1.—Salient coke statistics

	1957–59 (average)	1963	1964	1965
United States:				
Production:				
Oven coke ___short tons____	60,551,900	53,307,609	60,908,391	65,197,523
Beehive coke _________do____	1,254,232	970,698	1,236,287	1,656,938
Total ______________do____	61,806,132	54,278,307	62,144,678	66,854,461
Imports __________________do____	120,908	152,595	103,286	89,620
Exports __________________do____	558,428	451,241	523,695	833,668
Producers' stocks, Dec. 31__do____	[1] 4,682,436	2,884,931	1,971,892	2,702,946
Consumption, apparent ___do____	60,585,947	55,001,541	62,637,308	65,379,359
Ovens:				
Slot in existence, Dec. 31____	[1] 15,993	14,586	14,639	14,357
Beehive in existence, Dec. 31_	[1] 7,448	4,907	5,071	3,433
Value of coal-chemical materials used or sold __________________	$330,902,284	$254,220,290	$290,952,399	$311,406,722
Value of coke and breeze produced ________________________	1,143,589,918	977,060,009	1,128,925,328	1,153,730,420
Total value of all products_____	1,474,492,202	1,231,280,299	1,419,877,727	1,465,137,142
World production:				
Hard coke__thousand short tons__	287,855	r 307,308	r 326,434	340,723
Gashouse and low-temperature coke ___________________do____	51,130	r 49,990	r 48,620	46,260

[1] 1959.

Table 2.—Statistical summary of the coke industry in the United States in 1965

	Slot ovens	Beehive ovens	Total
Coke produced:			
At merchant plants:			
Short tons ______________________________	6,673,272	(1)	(1)
Value __________________________________	$152,139,083	(1)	(1)
At furnace plants:[2]			
Short tons ______________________________	58,524,251	(1)	(1)
Value __________________________________	$948,804,704	(1)	(1)
Total:			
Short tons ______________________________	65,197,523	1,656,938	66,854,461
Value __________________________________	$1,100,943,787	$24,812,638	$1,125,756,425
Breeze produced:			
Short tons ________________________________	4,037,264	43,240	4,080,504
Value ____________________________________	$27,887,455	$86,540	$27,973,995
Coal carbonized:			
Bituminous:			
Short tons ______________________________	92,086,030	2,692,701	94,778,731
Value __________________________________	$875,445,152	$14,566,515	$890,011,667
Average per ton _____________________	$9.51	$5.41	$9.39
Anthracite:			
Short tons ______________________________	507,207	—	507,207
Value __________________________________	$5,444,240	—	$5,444,240
Average per ton _____________________	$10.73	—	$10.73
Total:			
Short tons ______________________________	92,593,237	2,692,701	95,285,938
Value __________________________________	$880,889,392	$14,566,515	$895,455,907
Average per ton _____________________	$9.51	$5.41	$9.40
Average yield in percent of total coal carbonized:			
Coke ____________________________________	70.41	61.53	70.16
Breeze (at plants actually recovering) ______	4.36	1.61	4.28
Coke used by producing companies:			
In blast furnaces:			
Short tons ______________________________	55,396,843	(3)	55,396,843
Value __________________________________	$892,185,826	(3)	$892,185,826
In foundries:			
Short tons ______________________________	383,046	—	383,046
Value __________________________________	$12,457,029	—	$12,457,029
For other industrial uses:[4]			
Short tons ______________________________	609,893	—	609,893
Value __________________________________	$10,378,564	—	$10,378,564
Breeze used by producing companies:			
In steam plants:			
Short tons ______________________________	641,572	—	641.572
Value __________________________________	$4,146,641	—	$4,146,641
In agglomerating plants:			
Short tons ______________________________	1,744,481	—	1,744,481
Value __________________________________	$11,421,995	—	$11,421,995
For other industrial uses:			
Short tons ______________________________	427,276	—	427,276
Value __________________________________	$2,769,952	—	$2,769,952

Table 2.—Statistical summary of the coke industry in the United States in 1965—Continued

	Slot ovens	Beehive ovens	Total
Coke sold (commercial sales):			
To blast furnaces:			
Short tons	3,659,660	1,141,974	4,801,634
Value	$60,243,433	$16,609,949	76,853,382
Average per ton	$16.46	$14.54	$16.01
To foundries:			
Short tons	2,906,258	10,784	2,917,042
Value	$89,909,586	$164,644	$90,074,230
Average per ton	$30.94	$15.27	$30.88
To other industrial plants:			
Short tons	1,361,105	487,131	1,848,236
Value	$22,339,959	$7,852,156	$30,192,115
Average per ton	$16.41	$16.12	$16.34
For residential heating:			
Short tons	138,800	16,825	155,625
Value	$2,376,102	$183,285	$2,559,387
Average per ton	$17.12	$10.89	$16.45
Breeze sold (commercial sales):			
Short tons	1,270,067	42,211	1,312,278
Value	$9,839,966	$84,659	$9,924,625
Average per ton	$7.75	$2.01	$7.56
Coal-chemical materials produced:			
Crude tar:			
Gallons	802,737,740	—	802,737,740
Gallons per ton of coal	8.67	—	8.67
Ammonia:[5]			
Short tons	803,758	—	803,758
Pounds per ton of coal	17.73	—	17.73
Crude light oil:			
Gallons	262,700,991	—	262,700,991
Gallons per ton of coal	2.91	—	2.91
Gas:			
Thousand cubic feet	978,007,364	—	978,007,364
Thousand cubic feet per ton of coal	10.56	—	10.56
Percent burned in coking process	34.58	—	34.58
Percent surplus used or sold	64.40	—	64.40
Percent wasted	1.02	—	1.02
Value of coal-chemical materials used or sold:			
Crude tar and derivatives:			
Used	$33,553,200	—	$33,553,200
Sold	$62,199,165	—	$62,199,165
Ammonia products[6]	$24,852,967	—	$24,852,967
Crude light oil and derivatives[7]	$46,737,480	—	$46,737,480
Surplus gas	$144,063,910	—	$144,063,910

[1] Not separately recorded.
[2] Plants associated with iron-blast furnaces (refer to definition in "Scope of Report").
[3] Included with sales to avoid disclosing individual company data.
[4] Includes coke for producer-gas manufacture.
[5] In terms of sulfate equivalent.
[6] Includes ammonium sulfate, ammonia liquor (NH_3 content), and diammonium phosphate.
[7] Includes intermediate light oil.

Table 3.—Summary of oven-coke operations in the United States in 1965, by State

State	In existence Dec. 31[1] Plants	In existence Dec. 31[1] Ovens	Coal carbonized (short tons)	Yield of coke from coal (percent)	Coke produced (short tons)	Value of coke at ovens Total	Value of coke at ovens Per ton
Alabama	7	1,516	7,256,176	75.67	5,490,718	$90,149,213	$16.42
California, Colorado, Utah	3	773	5,062,990	62.94	3,186,675	73,753,682	23.14
Connecticut, Maryland, New Jersey, New York	6	1,802	11,893,318	70.86	8,427,762	141,728,472	16.82
Illinois	6	568	3,607,147	69.42	2,503,994	49,165,239	19.63
Indiana	5	2,218	11,996,819	69.31	8,315,372	141,664,384	17.04
Kentucky, Missouri, Tennessee, Texas	5	438	2,916,509	71.13	2,074,446	39,559,593	19.07
Michigan	3	739	5,404,173	73.63	3,979,033	65,991,426	16.58
Minnesota and Wisconsin	3	380	1,448,568	77.16	1,117,784	23,868,790	21.35
Ohio	12	1,836	10,890,945	70.41	7,668,758	123,510,249	16.11
Pennsylvania	12	3,419	26,976,822	70.11	18,912,128	292,109,243	15.45
West Virginia	3	668	5,139,770	68.50	3,520,853	59,443,496	16.88
Total 1965	65	14,357	92,593,237	70.41	65,197,523	1,100,943,787	16.89
At merchant plants	17	1,855	9,126,540	73.12	6,673,272	152,139,083	22.80
At furnace plants	48	12,502	83,466,697	70.12	58,524,251	948,804,704	16.21
Total 1964	66	14,639	87,224,479	69.83	60,908,391	1,083,876,181	17.80

[1] Excludes plants retired permanently during year.

Table 4.—Summary of beehive-coke operations in the United States in 1965, by State

State	In existence Dec. 31 [1]		Coal carbonized (short tons)	Yield of coke from coal (percent)	Coke produced (short tons)	Value of coke at ovens	
	Plants	Ovens				Total	Per ton
Pennsylvania	12	2,200	1,421,662	61.87	879,596	$12,257,435	$13.94
Kentucky, Virginia, West Virginia	9	1,233	1,271,039	61.16	777,342	12,555,203	16.15
Total:							
1965	21	3,433	2,692,701	61.53	1,656,938	24,812,638	14.97
1964	26	5,071	2,025,415	61.04	1,236,287	18,592,081	15.04

[1] Excludes plants retired permanently during year.

SCOPE OF REPORT

This chapter covers high-temperature oven and beehive coke and related products. All data, except where noted, were supplied by coke-producing companies in the United States. Only products made in high-temperature slot and beehive ovens were included; products made by other carbonization processes (coal-gas retorts, low-temperature coal carbonization, and carbonization of residues from the refining of coal tar and petroleum) were specifically excluded.

In addition to coke produced in high-temperature slot and beehive ovens, six companies produced an estimated 150,000 tons of coke and char in unconventional carbonizing units. One plant carbonized lignite in a Lurgi gasifier and manufactured briquets from the char. Three plants produced high-temperature coke with traveling-grate stokers, while two experimental rotary-hearth plants produced high-temperature chemical coke. One plant that had produced a low-temperature coke, known as Disco, was dismantled and did not operate in 1965.

Of the 66 oven-coke plants surveyed by the Bureau of Mines in 1965, 63 were active all year, 2 were idle all year, and 1 was active part of the year, but later was closed permanently. Of the 27 beehive plants surveyed, only 11 operated the entire year, 8 were active part of the year, and the remainder were idle.

The terms "merchant" and "furnace" in this chapter apply only to oven-coke plants. Furnace plants are owned by, or are financially affiliated with, iron and steel companies that produce coke mainly for use in their own blast furnaces. Merchant plants include those that manufacture metallurgical, industrial, and residential-heating grades of coke for sale on the open market; those associated with chemical companies or gas utilities; and those affiliated with local iron works that consume only a small part of their output in affiliated blast furnaces.

The term "coke" in this chapter refers only to the large sizes (usually plus one-half inch) from which the smaller sizes, called breeze, have been screened. "Metallurgical coke" refers to grades used for smelting and casting ferrous metals in blast furnaces and foundries.

OVEN AND BEEHIVE COKE AND BREEZE

MONTHLY AND AVERAGE DAILY PRODUCTION

An upward trend of industrial activity that began in the latter part of 1964 continued through 1965, and coke production increased significantly, particularly during the first part of the year. Average daily production for the 12-month period was 8 percent over the average recorded daily in the base years, 1957–59. Peak production of oven coke for the year occurred in May when daily output averaged 187,300 tons, the highest rate recorded since April 1960. Beehive plants also operated at increased rates, and an average daily production of 6,300 tons in March was the highest achieved since April 1957. Production from both segments of the industry declined to more normal levels during the latter part of the year, however. Table 5 summarizes monthly and average daily production of oven and beehive coke in 1964 and shows comparable data for the two preceding years and for the 1957–59 benchmark period.

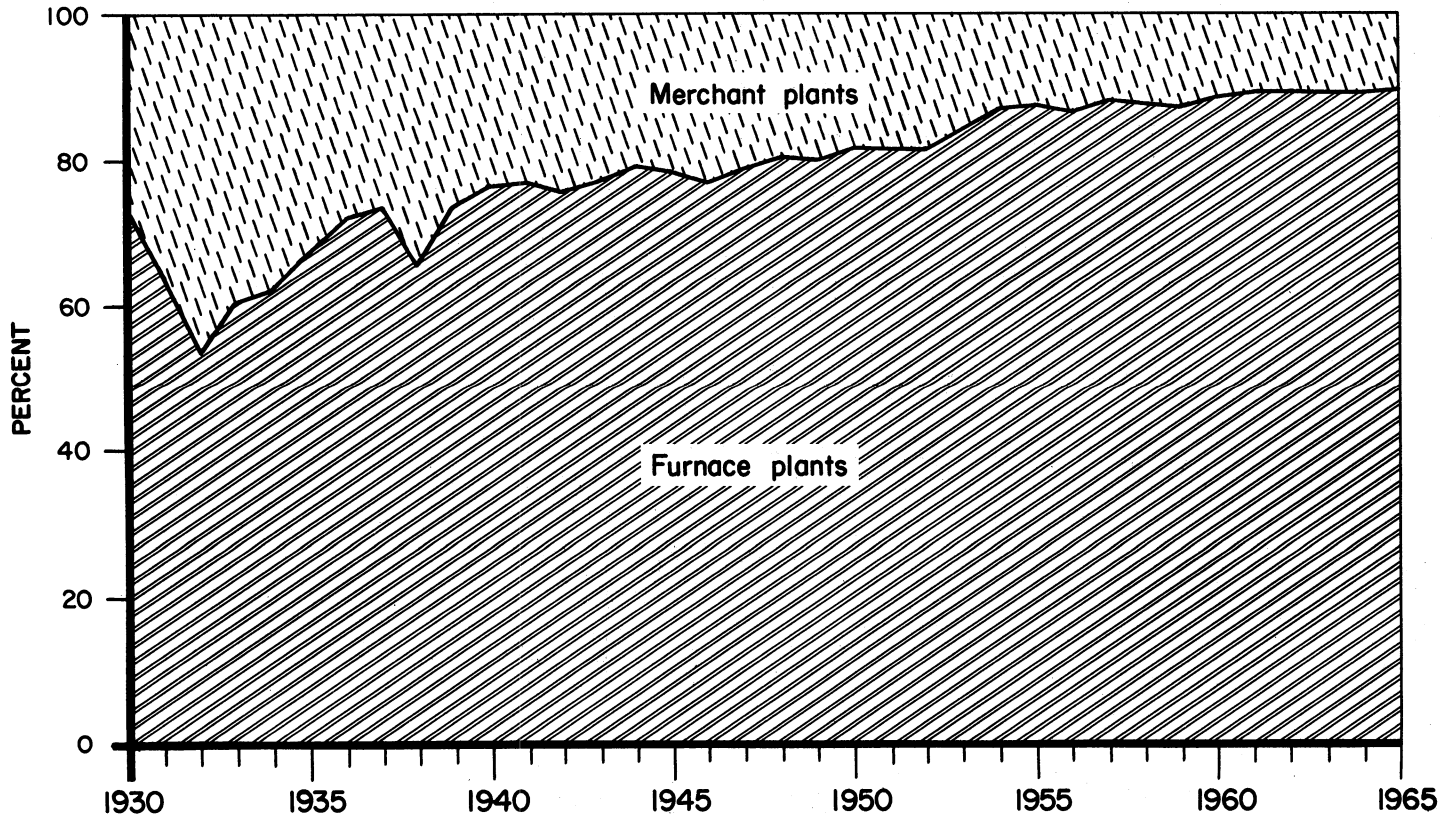

Figure 2.—Production of oven coke in the United States, by type of plant.

Table 5.—Production of oven and beehive coke in the United States, by month [1]
(Short tons)

Month	1957–59 (average) Total	1957–59 (average) Daily average	1963 Total	1963 Daily average	1964 Total	1964 Daily average	1965 Total	1965 Daily average
Oven coke:								
January	5,630,000	181,600	4,244,600	136,900	4,660,100	150,300	5,626,200	181,500
February	5,159,400	184,300	3,953,800	141,200	4,485,000	154,700	5,149,200	183,900
March	5,744,700	185,300	4,627,500	149,300	4,820,300	155,500	5,755,400	185,700
April	5,378,300	179,300	4,740,300	158,000	4,853,900	161,800	5,592,900	186,400
May	5,532,400	178,500	4,963,400	160,100	5,191,500	167,500	5,806,300	187,300
June	5,352,800	178,400	4,734,100	157,800	5,036,500	167,900	5,589,900	186,300
July	4,603,300	148,500	4,466,500	144,100	5,163,400	166,500	5,622,900	181,400
August	4,151,700	133,900	4,200,400	135,500	5,138,200	165,800	5,572,700	179,800
September	4,121,500	137,400	4,157,200	138,600	5,141,000	171,300	5,230,200	174,300
October	4,340,000	140,000	4,390,600	141,600	5,476,100	176,600	5,179,200	167,100
November	5,002,600	166,800	4,289,000	143,000	5,373,300	179,100	4,948,600	165,000
December	5,535,200	178,500	4,540,200	146,500	5,569,100	179,600	5,124,000	165,300
Total	60,551,900	165,900	53,307,600	146,000	60,908,400	166,400	65,197,500	178,600
Beehive coke:								
January	132,200	4,300	66,400	2,200	86,100	2,800	178,500	5,700
February	127,900	4,500	67,100	2,400	82,100	2,800	163,300	5,800
March	150,300	4,900	66,900	2,100	93,100	3,000	197,100	6,300
April	138,900	4,600	87,600	2,900	92,500	3,100	162,700	5,500
May	118,700	3,800	102,000	3,300	93,900	3,000	149,000	4,800
June	107,900	3,600	96,200	3,200	81,400	2,700	176,500	5,900
July	80,000	2,600	84,200	2,700	69,800	2,300	159,000	5,100
August	82,600	2,700	79,500	2,600	94,300	3,000	164,800	5,300
September	78,600	2,600	79,000	2,600	113,200	3,800	89,900	3,000
October	75,300	2,400	82,600	2,700	126,800	4,100	73,500	2,300
November	76,100	2,500	77,600	2,600	142,300	4,800	65,100	2,100
December	85,700	2,800	81,600	2,600	160,800	5,200	77,600	2,500
Total	1,254,200	3,400	970,700	2,700	1,236,300	3,400	1,657,000	4,600
Total:								
January	5,762,200	185,900	4,311,000	139,100	4,746,200	153,100	5,804,700	187,200
February	5,287,300	188,800	4,020,900	143,600	4,567,100	157,500	5,312,500	189,700
March	5,895,000	190,200	4,694,400	151,400	4,913,400	158,500	5,952,500	192,000
April	5,517,200	183,900	4,827,900	160,900	4,946,400	164,900	5,755,600	191,900
May	5,651,100	182,300	5,065,400	163,400	5,285,400	170,500	5,955,300	192,100
June	5,460,700	182,000	4,830,300	161,000	5,117,900	170,600	5,766,400	192,200
July	4,683,300	151,100	4,550,700	146,800	5,233,200	168,800	5,781,900	186,500
August	4,234,300	136,600	4,279,900	138,100	5,232,500	168,800	5,737,500	185,100
September	4,200,100	140,000	4,236,200	141,200	5,254,200	175,100	5,320,100	177,300
October	4,415,300	142,400	4,473,200	144,300	5,602,900	180,700	5,252,700	169,400
November	5,078,700	169,300	4,366,600	145,600	5,515,600	183,900	5,013,700	167,100
December	5,620,900	181,300	4,621,800	149,100	5,729,900	184,800	5,201,600	167,800
Grand total	61,806,100	169,300	54,278,300	148,700	62,144,700	169,800	66,854,500	183,200

[1] Daily average calculated by dividing monthly production by number of days in month.

PRODUCTION BY MERCHANT AND FURNACE PLANTS

The overall increase in oven-coke production was attributed to an increased output of both furnace and merchant plants. In addition to the increased coke requirements of steel plants, which are supplied primarily by furnace plants, there was a greater demand for coke by foundries, nonferrous smelters, chemical plants, and other industries—markets that normally are supplied by merchant plants.

Although production at merchant plants increased and was higher than in any other year since 1959, merchant-plant output in relation to total production continued to decrease and was lower in 1965 than in any other year of record. This decline, which is shown graphically in figure 2, has been caused by the gradual loss of coke markets, principally for manufacturing producer gas and water gas and for residential heating, to oil and gas. Contributing also to the decline in merchant-plant output in recent years has been the increased capability of steel companies to supply their own normal requirements for blast-furnace coke.

Production of oven coke by merchant and furnace plants in 1965 is shown in tables 6 and 7.

Table 6.—Production of oven coke in the United States, by type of plant

(Short tons)

Month	1957–59 (average) Merchant plants	1957–59 (average) Furnace plants	1963 Merchant plants	1963 Furnace plants	1964 Merchant plants	1964 Furnace plants	1965 Merchant plants	1965 Furnace plants
Production:								
January	705,700	4,924,300	488,400	3,756,200	515,000	4,145,100	571,100	5,055,100
February	641,100	4,518,300	455,700	3,498,100	507,000	3,978,000	521,700	4,627,500
March	681,400	5,063,300	497,900	4,129,600	541,200	4,279,100	598,100	5,157,300
April	612,900	4,765,400	483,100	4,257,200	528,300	4,325,600	563,600	5,029,300
May	609,800	4,922,600	478,400	4,485,000	544,100	4,647,400	577,100	5,229,200
June	575,800	4,777,000	468,500	4,265,600	520,700	4,515,800	548,900	5,041,000
July	569,100	4,034,200	436,800	4,029,700	524,500	4,638,900	559,400	5,063,500
August	573,200	3,578,500	451,300	3,749,100	494,900	4,643,300	552,900	5,019,800
September	572,900	3,548,600	435,600	3,721,600	514,600	4,626,400	528,200	4,702,000
October	586,000	3,754,000	475,600	3,915,000	532,600	4,943,500	551,300	4,627,900
November	582,700	4,419,900	452,600	3,836,400	546,000	4,827,300	544,000	4,404,600
December	649,000	4,886,200	502,800	4,037,400	566,600	5,002,500	557,000	4,567,000
Total	7,359,600	53,192,300	5,626,700	47,680,900	6,335,500	54,572,900	6,673,300	58,524,200
Daily average:								
January	22,800	158,800	15,700	121,200	16,600	133,700	18,400	163,100
February	22,900	161,400	16,300	124,900	17,500	137,200	18,600	165,300
March	22,000	163,300	16,100	133,200	17,500	138,000	19,300	166,400
April	20,400	158,900	16,100	141,900	17,600	144,200	18,800	167,600
May	19,700	158,800	15,400	144,700	17,600	149,900	18,600	168,700
June	19,200	159,200	15,600	142,200	17,400	150,500	18,300	168,000
July	18,400	130,100	14,100	130,000	16,900	149,600	18,100	163,300
August	18,500	115,400	14,600	120,900	16,000	149,800	17,900	161,900
September	19,100	118,300	14,500	124,100	17,100	154,200	17,600	156,700
October	18,900	121,100	15,300	126,300	17,200	159,400	17,800	149,300
November	19,400	147,400	15,100	127,900	18,200	160,900	18,200	146,800
December	20,900	157,600	16,200	130,300	18,300	161,300	18,000	147,300
Average for year	20,200	145,700	15,400	130,600	17,300	149,100	18,300	160,300

Table 7.—Production of oven coke and number of plants in the United States, by type of plant

Year	Number of active plants[1] Merchant plants	Number of active plants[1] Furnace plants	Coke produced (short tons) Merchant plants	Coke produced (short tons) Furnace plants	Percent of production Merchant plants	Percent of production Furnace plants
1929	41	46	12,187,439	41,224,387	22,8	77.2
1939	39	45	11,070,506	31,811,807	25.8	74.2
1949	31	55	12,112,922	48,109,559	20.1	79.9
1957–59 (average)	[2] 21	[2] 54	7,359,600	53,192,300	12.2	87.8
1962	17	49	5,438,368	45,660,052	10.6	89.4
1963	17	47	5,626,701	47,680,908	10.6	89.4
1964	17	47	6,335,528	54,572,863	10.4	89.6
1965	17	48	6,673,272	58,524,251	10.2	89.8

[1] Includes plants operating any part of year.
[2] Dec. 31, 1959.

PRODUCTION BY STATE

The relative amounts of coke produced in the various States has changed little in the past decade, except that Massachusetts ceased to be a coke-producing State in 1960. Because coke is used principally for blast-furnace fuel, the coke industry is concentrated in the steel-producing areas of the Eastern and North Central States, and the bulk of the coke in 1965 was produced in 15 States east of the Mississippi River. However, about 5 million tons, 7 percent of the production, was produced in California, Colorado, Minnesota, Missouri, Texas, and Utah.

Pennsylvania, the largest producer, accounted for 30 percent of the output of oven and beehive coke in 1965. Pennsylvania's production was more than double that of Indiana, the next largest producer which had 12 percent of the total. Both States had larger outputs than in 1964, principally because of the greater demand for blast-furnace coke. Ohio, which lost its position as the second largest coke producer several years ago when operations were discontinued at the U.S. Steel plants in Cleveland and Lorain, ranked third in output. Although Ohio's production increased 6 percent over 1964, output was 14 percent lower than the State's average annual output in the 1957–59 period. All other States except Connecticut, Missouri, New Jersey, Tennessee, Texas, Utah, and West Virginia showed production increases over the base period.

Production of oven and beehive coke by States is shown in table 8.

SCREENINGS OR BREEZE

Breeze is the term applied to the small sizes of coke that result from screening. Although there is no designated size, breeze usually includes the coke that passes through a ½-inch screen, or in a few instances, a ⅝-inch screen. In past years, this material, which generally has a higher ash and moisture content than the large sizes, has been used principally as boiler fuel at producing plants. Although about 16 percent of the production is still used for this purpose by producers, usage has changed considerably in the past decade and 43 percent of the production in 1965 was used by producers for sintering iron ores.

Breeze is in demand also as a fuel for smelting phosphate rock, and it is estimated that at least 600,000 tons of the estimated 800,000 tons of coke used for producing elemental phosphorus in 1965 was breeze, and the remainder was larger size coke that was crushed. Breeze was shipped also to plants that manufacture mineral wool, and to a number of other industrial plants.

The yield of breeze at oven-coke plants ranged between 8.11 percent for plants in Pennsylvania to 4.32 percent for Ohio plants but averaged 4.36 percent for the industry. Most beehive plants do not recover breeze, but the average yield for the plants that did report production was 1.65 percent.

Table 9 shows the production and disposal of breeze in 1965 by State; table 10 shows the quantities of breeze used by producers according to major end use and the quantities and values of the breeze sold in 1965 and in prior years and base periods.

DISPOSAL

Consumption and Sales.—Allowing for imports, exports, and changes in producers' stocks the amount of coke apparently consumed in the United States in 1965 was 4 percent greater than in 1964. The 2.7-million-ton increase resulted principally from the larger requirement of blast furnaces. However, foundries and other industrial

Table 8.—Production of coke in the United States, by State
(Short tons)

State	(1957–59) (average)	1962	1963	1964	1965
Oven coke:					
Alabama	5,024,645	4,109,628	4,281,587	4,689,108	5,490,718
California, Colorado, Utah	2,701,547	2,406,276	2,408,363	2,935,921	3,186,675
Connecticut, Maryland, New Jersey, New York	[1] 7,821,854	6,499,514	6,354,716	7,687,284	8,427,762
Illinois	2,291,276	1,917,391	1,871,204	2,298,576	2,503,994
Indiana	8,148,294	7,027,014	7,541,430	8,170,323	8,315,372
Kentucky, Missouri, Tennessee, Texas	2,097,415	1,772,084	2,010,349	2,058,916	2,074,446
Michigan	3,166,295	3,164,917	3,460,027	3,907,944	3,979,033
Minnesota and Wisconsin	1,058,305	757,032	786,923	932,804	1,117,784
Ohio	8,871,503	6,848,812	6,339,546	7,243,587	7,668,758
Pennsylvania	15,935,874	13,985,742	15,245,046	17,594,174	18,912,128
West Virginia	3,434,892	2,610,010	3,008,418	3,389,754	3,520,853
Total	60,551,900	51,098,420	53,307,609	60,908,391	65,197,523
Beehive coke:					
Pennsylvania	895,358	384,839	383,979	561,777	879,596
Kentucky, Virginia, West Virginia	[2] 358,874	427,033	[3] 586,719	674,510	777,342
Total	1,254,232	811,872	970,698	1,236,287	1,656,938
Grand total	61,806,132	51,910,292	54,278,307	62,144,678	66,854,461

[1] Includes Massachusetts.
[2] Includes Utah.
[3] Excludes West Virginia.

Table 9.—Breeze recovered at coke plants in the United States in 1965, by State

State	Yield per ton of coal [1] (percent)	Produced		Used by producers—						Sold		On hand Dec. 31 (short tons)
		Short tons	Value	In steam plants		In agglomerating plants		For other industrial use		Short tons	Value	
				Short tons	Value	Short tons	Value	Short tons	Value			
Oven coke:												
Alabama	4.49	326,045	$2,474,056	(2)	(2)	102,760	$659,434	28,694	$202,546	196,291	$1,708,139	52,480
California, Colorado, Utah	4.95	250,580	2,048,931	—	—	202,795	1,493,265	22,074	139,777	(2)	(2)	7,835
Connecticut, Maryland, New Jersey, New York	5.17	615,268	3,769,453	409,593	$2,592,498	(2)	(2)	54,278	302,058	23,013	196,981	227,813
Illinois	5.55	200,258	1,340,174	20,367	132,415	122,313	813,010	15,878	115,162	43,197	297,115	34,678
Indiana	4.97	596,731	3,474,570	43,485	260,665	502,190	3,004,883	42,696	283,691	125,724	688,688	318,345
Kentucky, Missouri, Tennessee, Texas	5.92	172,652	1,545,493	(2)	(2)	(2)	(2)	(2)	(2)	126,991	1,103,434	23,757
Michigan	4.34	234,641	1,985,807	(2)	(2)	(2)	(2)	(2)	(2)	100,136	808,036	5,626
Minnesota and Wisconsin	4.47	64,801	428,697	—	—	25,348	164,762	51,900	255,554	(2)	(2)	33,259
Ohio	4.32	470,877	3,791,560	39,945	348,036	41,285	345,958	59,299	443,308	309,240	2,541,700	91,556
Pennsylvania	8.11	869,477	5,551,775	86,344	551,897	469,972	3,066,187	60,277	327,354	238,816	1,644,862	259,912
West Virginia	4.59	235,934	1,476,939	(2)	(2)	(2)	(2)	33,301	211,659	(2)	(2)	3,591
Undistributed	—	—	—	41,838	261,130	277,818	1,874,496	58,879	488,843	106,659	851,011	—
Total 1965	4.36	4,037,264	27,887,455	641,572	4,146,641	1,744,481	11,421,995	427,276	2,769,952	1,270,067	9,839,966	[3] 1,058,852
At merchant plants	5.71	521,211	4,381,322	107,045	1,004,583	—	—	68,416	395,516	371,340	3,110,616	110,170
At furnace plants	4.21	3,516,053	23,506,133	534,527	3,142,058	1,744,481	11,421,995	358,860	2,374,436	898,727	6,729,350	948,682
Total 1964	4.47	3,902,047	26,411,679	632,391	3,956,378	1,763,660	11,562,902	434,015	2,629,429	1,093,052	8,259,236	[3] 1,112,571
Beehive coke:												
Pennsylvania	2.62	35,184	50,661	—	—	—	—	—	—	34,325	49,169	—
Kentucky, Virginia, West Virginia	0.79	8,056	35,879	—	—	—	—	—	—	7,886	35,490	350
Total												
1965	1.65	43,240	86,540	—	—	—	—	—	—	42,211	84,659	350
1964	3.84	22,383	44,956	—	—	—	—	—	—	22,638	45,387	30

[1] Calculated by dividing production by coal carbonized at plants actually recovering breeze.
[2] Included with "Undistributed" to avoid disclosing individual company data.
[3] Includes some breeze resulting from the screening of coke at blast furnaces.

Table 10.—Oven- and beehive-coke breeze used and sold in the United States, by use

(Short tons)

Year	Used by producers— In steam plants	In agglomerating plants	For other industrial use	Sold	Average value per ton
1947–49 (average)	3,450,905	[e] 300,000	[1] 489,055	1,142,589	$3.79
1957–59 (average)	1,612,547	796,390	447,171	1,042,308	7.22
1962	720,466	1,471,530	594,997	816,356	7.71
1963	609,518	1,794,566	388,499	984,429	7.17
1964	632,391	1,763,660	434,015	1,115,690	7.44
1965	641,572	1,744,481	427,276	1,312,278	7.56

[e] Estimate.
[1] Includes 77,795 tons used to make producer or water gas.

plants also used increased quantities of coke. Only the quantity of coke used for residential heating declined.

Although consumption has increased significantly in the past few years, the amount of coke consumed in 1965 was 17 percent less than the record 78 million tons consumed in 1951. A number of economic and technologic factors have contributed to this decline but the most important, undoubtedly, has been the substitution of fuel oil and natural gas for coke in residential heating and producer-and water-gas markets, and declining blast-furnace fuel rates. Of these, the latter has had the most profound effect, for the bulk of the coke produced in the United States is used for blast-furnace fuel.

The steady decline in blast-furnace coke rates is shown graphically in figure 3. Except for 1965, when the rate increased slightly because of the high operating rate of blast furnaces, the coke rate has decreased each year since 1951, and, in 1965, only 0.665 ton of coke was required to produce each ton of pig iron and blast-furnace ferroalloys, compared with 0.935 ton required in 1951. The 0.27-ton decrease recorded over the 14-year period is equivalent to a 29-percent reduction in the amount of coke required per unit of blast-furnace production. The net effect of the reduction, however, can best be emphasized by noting that if the 88.8 million tons of pig iron and ferroalloy output in 1965 had been produced in blast furnaces operating at the 1951 coke rate, total blast-furnace coke requirements for the year would have been 83 million tons, rather than 59 million tons actually consumed.

Data on total coke consumption for the past several years and several base periods are shown in table 11; data on coke rates for selected years are shown in table 12.

Tables 13 and 14 show the quantities of coke used and sold in each State in 1965. A total of 66 million tons of oven and beehive coke was sold and used for all purposes, of which about 87 percent was oven coke supplied by furnace plants. The bulk of this coke was retained by producers for use in blast-furnace operations. Furnace plants, however, sold approximately 1.7 million tons of coke on the open market, about 21 percent of the oven coke sold commercially. This coke was sold principally to blast furnaces and other industrial plants, but furnace plants also sold 222,000 tons to foundries, and 3,000 tons for residential heating.

Most of the coke produced by merchant plants was sold, principally to blast-furnace operations without coke facilities, independent gray-iron foundries, nonferrous smelters, and chemical plants. However, a few merchant plants operated coke ovens to supply their own coke requirements, and about 4 percent of the merchant coke distributed was retained by producers. This coke was used principally in chemical plants for producing soda ash, but some was used also in affiliated foundries and producer-gas plants. Of the 6.4 million tons of oven coke sold by merchant plants in 1965, 44 percent was shipped to blast furnaces, 42 percent to foundries, and 12 percent to other industrial plants; the remaining 2 percent was sold for residential heating.

Beehive plants supplied 2.5 percent of the coke distributed in 1965. As in past years, the major part of the beehive coke was used for blast-furnace fuel. However, increasing amounts of beehive coke have been shipped to chemical plants for use in

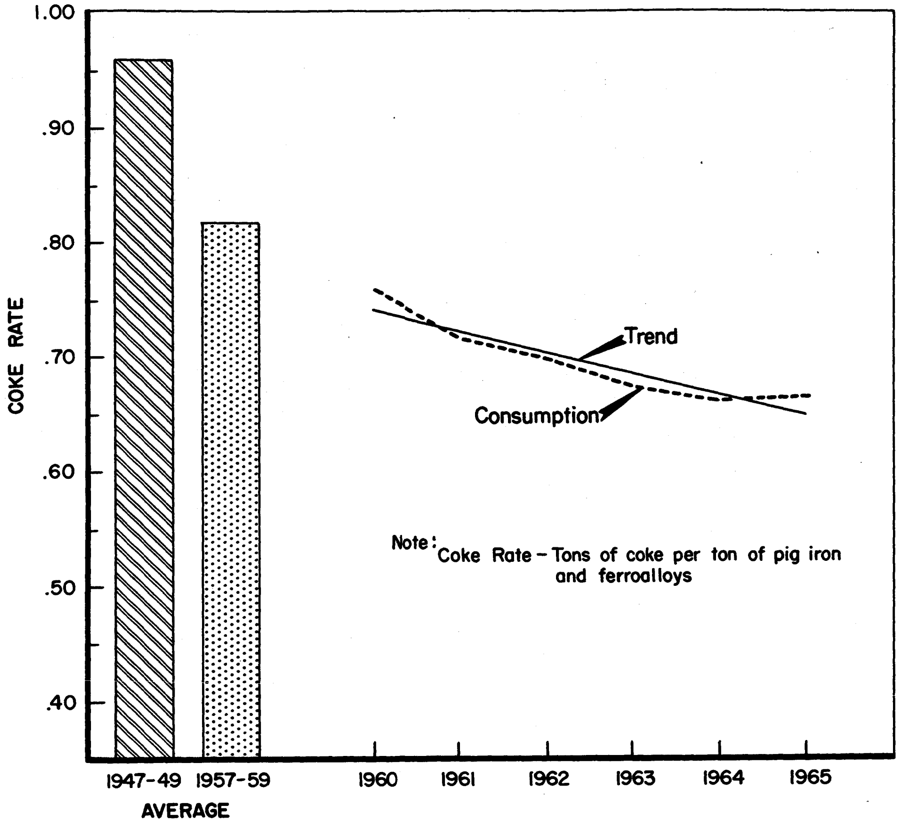

Figure 3.—Coke consumption per short ton of pig iron and ferroalloys produced in blast furnaces in the United States.

Table 11.—Apparent consumption of coke in the United States

(Short tons)

Year	Total production	Imports	Exports	Net change in stocks	Apparent U.S. consumption [2]	Consumption: In iron furnaces [1] Quantity	Consumption: In iron furnaces [1] Percent	Consumption: All other purposes Quantity	Consumption: All other purposes Percent
1937–39 (average)	43,065,975	187,838	534,393	+290,011	42,429,409	28,009,630	66.0	14,419,779	34.0
1947–49 (average)	70,648,402	181,000	696,699	+280,230	69,852,473	55,877,463	80.0	13,975,010	20.0
1957–59 (average)	61,806,132	120,908	558,428	+782,665	60,585,947	54,140,391	89.4	6,445,556	10.6
1962	51,910,292	141,883	364,032	—135,062	51,823,205	46,244,675	89.2	5,578,530	10.8
1963	54,278,307	152,595	451,241	—1,021,880	55,001,541	r 48,869,609	88.9	r 6,131,932	11.1
1964	62,144,678	103,286	523,695	—913,039	62,637,308	57,063,389	91.1	5,573,919	8.9
1965	66,854,461	89,620	833,668	+731,054	65,379,359	59,072,192	90.4	6,307,167	9.6

r Revised.
[1] American Iron and Steel Institute; figures include coke consumed in manufacturing ferroalloys.
[2] Production plus imports minus exports, plus or minus net change in stocks.

Table 12.—Coke and coking coal consumed per short ton of pig iron and ferroalloys produced in the United States

Year	Coke per short ton of pig iron and ferroalloys [1] (pounds)	Yield of coke from coal (percent)	Coking coal per short ton of pig iron and ferroalloys (pounds calculated)	Year	Coke per short ton of pig iron and ferroalloys [1] (pounds)	Yield of coke from coal (percent)	Coking coal per short ton of pig iron and ferroalloys (pounds calculated)
1913	2,172.6	66.9	3,247.5	1957–59 (average)	1,634.4	70.0	2,334.9
1918	2,120.7	66.4	3,193.8	1962	1,395.2	69.5	2,007.5
1929	1,838.0	69.0	2,663.8	1963	1,350.5	69.5	1,943.2
1939	1,778.0	69.8	2,547.3	1964	1,323.6	69.6	1,901.7
1949	1,895.8	69.6	2,723.9	1965	1,329.5	70.1	1,896.6

[1] American Iron and Steel Institute; consumption per ton of pig iron only, excluding furnaces making ferroalloys, was 2,172.6 pounds in 1913, 2,120.7 in 1918, 1,813.3 in 1929, 1,760.0 in 1939, 1,870.4 in 1949, 1,617.0 in 1957–59 (average), 1,379.0 in 1962, 1,338.1 in 1963, 1,310.0 in 1964, and 1,312.0 in 1965.

the production of calcium carbide and elemental phosphorus in recent years and, in 1965, shipments other than those to blast furnace plants made up 31 percent of the total. The bulk of this coke was consumed in the plants previously mentioned; only small quantities of beehive coke were used in foundries and for residential heating.

Geographic Distribution.—All States except Hawaii, Alaska, and Nevada either produced or received shipments of coke in 1965. Except for Idaho and Iowa which received substantial shipments of foundry and chemical coke, most nonproducing States received relatively small amounts.

The bulk of the coke distributed was blast-furnace coke that was consumed within the producing State, as most blast-furnace installations are integrated with coke ovens. Generally this coke moves only short distances, usually by conveyor belt or company-operated railroad within the producing establishment. Roughly 90 percent of the blast-furnace coke is involved in this type of movement. However, a few companies shipped coke to affiliated blast furnaces in other States, and about 5.6 million tons of blast-furnace coke was involved in interstate shipments. In most instances this coke moved only short distances to blast furnaces in adjoining States.

Unlike blast-furnace coke, foundry coke was distributed widely, and many shipments involved long-distance rail hauls. In some instances foundry coke was shipped from Eastern plants to foundries on the West Coast. The bulk of the foundry coke is consumed, however, in the highly industrialized States of the East and the Midwest and the principal consumers in 1965 were Alabama, Illinois, Indiana, Michigan, New York, Ohio, Pennsylvania, and Wis-

Table 13.—Oven coke produced in the United States, used by producers, and sold in 1965, by State

State	Produced		Used by producing companies: In blast furnaces		Used by producing companies: For other purposes [1]		Commercial sales: To blast furnace plants	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Alabama	5,490,718	$90,149,213	4,287,142	$62,625,091	186,806	$4,041,856	(2)	(2)
California, Colorado, Utah	3,186,675	73,753,682	2,961,131	69,566,634	23,462	441,171	—	—
Connecticut, Maryland, New Jersey, New York	8,427,762	141,728,472	6,969,116	111,294,955	42,955	896,013	846,904	$14,944,730
Illinois	2,503,994	49,165,239	2,275,419	43,845,124	80,932	2,837,848	(2)	(2)
Indiana	8,315,372	141,664,384	7,646,574	123,980,809	30,783	506,023	(2)	(2)
Kentucky, Missouri, Tennessee, Texas	2,074,446	39,559,593	(2)	(2)	(2)	(2)	(2)	(2)
Michigan	3,979,033	65,991,426	(2)	(2)	(2)	(2)	(2)	(2)
Minnesota and Wisconsin	1,117,784	23,868,790	(2)	(2)	(2)	(2)	(2)	(2)
Ohio	7,668,758	123,510,249	6,321,804	96,406,524	295,441	5,049,842	500,667	8,178,745
Pennsylvania	18,912,128	292,109,243	17,429,980	265,684,643	19,373	310,965	420,638	7,299,675
West Virginia	3,520,853	59,443,496	3,082,599	52,950,012	1,330	25,270	(2)	(2)
Undistributed	—	—	4,423,078	65,832,034	311,857	8,726,605	1,891,451	29,820,283
Total 1965	65,197,523	1,100,943,787	55,396,843	892,185,826	992,939	22,835,593	3,659,660	60,243,433
At merchant plants	6,673,272	152,139,083	—	—	299,611	7,559,894	2,789,377	45,808,627
At furnace plants	58,524,251	948,804,704	55,396,843	892,185,826	693,328	15,275,699	870,283	14,434,806
Total 1964	60,908,391	1,083,876,181	52,840,688	914,103,967	1,010,978	22,528,036	3,459,794	53,780,793

State	Commercial sales—Continued: To foundries		To other industrial plants [3]		For residential heating		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Alabama	558,019	$16,482,798	266,656	$4,242,237	(2)	(2)	1,016,435	$23,589,958
California, Colorado, Utah	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Connecticut, Maryland, New Jersey, New York	347,090	10,733,216	112,939	2,058,909	77,249	$1,400,779	1,384,182	29,137,634
Illinois	—	—	(2)	(2)	(2)	(2)	122,809	1,904,030
Indiana	(2)	(2)	97,037	1,772,509	8,686	121,062	664,249	17,496,102
Kentucky, Missouri, Tennessee, Texas	(2)	(2)	84,034	1,557,127	(2)	(2)	1,378,353	25,047,715
Michigan	(2)	(2)	175,954	3,049,251	(2)	(2)	572,790	15,292,117
Minnesota and Wisconsin	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Ohio	352,564	10,867,755	(2)	(2)	(2)	(2)	1,007,132	21,408,401
Pennsylvania	215,829	6,586,740	158,430	2,288,103	11,785	191,954	806,682	16,366,472
West Virginia	—	—	(2)	(2)	(2)	(2)	399,742	5,893,290
Undistributed	1,432,756	45,239,077	466,055	7,371,823	41,080	662,307	713,449	18,733,361
Total 1965	2,906,258	89,909,586	1,361,105	22,339,959	138,800	2,376,102	8,065,823	174,869,080
At merchant plants	2,684,034	83,046,974	770,388	13,730,396	135,583	2,316,104	6,379,382	144,902,101
At furnace plants	222,224	6,862,612	590,717	8,609,563	3,217	59,998	1,686,441	29,966,979
Total 1964	2,697,531	82,084,643	1,456,528	23,004,280	239,812	3,905,145	7,853,665	162,774,861

[1] Comprises 383,046 tons valued at $12,457,029 used in foundries; 609,893 tons valued at $10,378,564 for other purposes.
[2] Included with "Undistributed" to avoid disclosing individual company data.
[3] Includes small amount to water-gas plants.

Table 14.—Beehive coke produced in the United States, used by producers, and sold in 1965, by State

State	Produced		Used by producing companies: In blast furnaces		Used by producing companies: For other purposes		Commercial sales: To blast furnace plants	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Pennsylvania	879,596	$12,257,435	(1)	(1)	--	—	775,076	$11,087,645
Kentucky, Virginia, West Virginia	777,342	12,555,203	----	----	--	—	366,898	5,522,304
Total: 1965	1,656,938	24,812,638	(1)	(1)	--	—	1,141,974	16,609,949
Total: 1964	1,236,287	18,592,081	(1)	(1)	--	—	698,734	10,168,092

State	Commercial sales—Continued: To foundries		To other industrial plants		For residential heating		Total	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Pennsylvania	(2)	(2)	88,032	$991,274	16,825	$183,285	879,933	$12,262,204
Kentucky, Virginia, West Virginia	10,784	$164,644	399,099	6,860,882	(3)	(3)	776,781	12,547,830
Total: 1965	10,784	164,644	487,131	7,852,156	16,825	183,285	1,656,714	24,810,034
Total: 1964	43,639	765,228	497,261	7,708,116	(4)	(4)	1,239,634	18,641,436

[1] Combined with coke sold "To blast furnace plants" to avoid disclosing individual company data.
[2] Combined with coke sold "For residential heating" to avoid disclosing individual company data.
[3] Combined with coke sold "To foundries" to avoid disclosing individual company data.
[4] Combined with coke sold "To other industrial plants" to avoid disclosing individual company data.

consin. All States named used more than 100,000 tons and, collectively, they consumed three-fourths of the total foundry coke distributed. The bulk of the foundry coke was sold to independent foundries, as producers used only 12 percent of the total distributed.

Coke used for miscellaneous industrial applications also was distributed widely, with 44 States receiving shipments of this type. The principal consumers were nonferrous smelters, alkali plants, and chemical plants that manufactured calcium carbide and elemental phosphorus. Alabama, Idaho, Kentucky, Michigan, Ohio, Pennsylvania, Tennessee, and Virginia consumed the largest amounts of other-industrial coke.

Twenty-nine States used coke for residential heating, but the total consumed for this purpose amounted to less than 1 percent of the total distributed.

Table 15 summarizes the distribution of oven and beehive coke and coke breeze by major end use and final destination. Shipments to producer-gas plants, too small to be considered a major end use, were combined with those to other-industrial plants.

STOCKS OF COKE AND BREEZE

Production of coke was 1 percent greater than the amount distributed, and producers' stocks at the end of the year were about 750,000 tons greater than when the year began. Virtually all of the increase was caused by a curtailment of shipments of furnace coke in the latter part of the year when the demand for blast-furnace coke declined.

Furnace plants ended the year with about 10 times as much coke on hand as merchant plants but, when measured in terms of days' production, furnace plants had a supply of only 15 days, compared with 14 days for merchant plants. Virtually all of the stocks at oven plants was blast-furnace coke. Stocks at merchant plants were composed of 18 percent blast-furnace coke; 39 percent, foundry coke; and 43 percent, other grades.

Stocks of coke at beehive plants varied only slightly from the preceding year and were insignificant.

Stocks of coke breeze decreased 5 percent. The largest reduction in breeze stocks for the yard was at plants in Indiana where

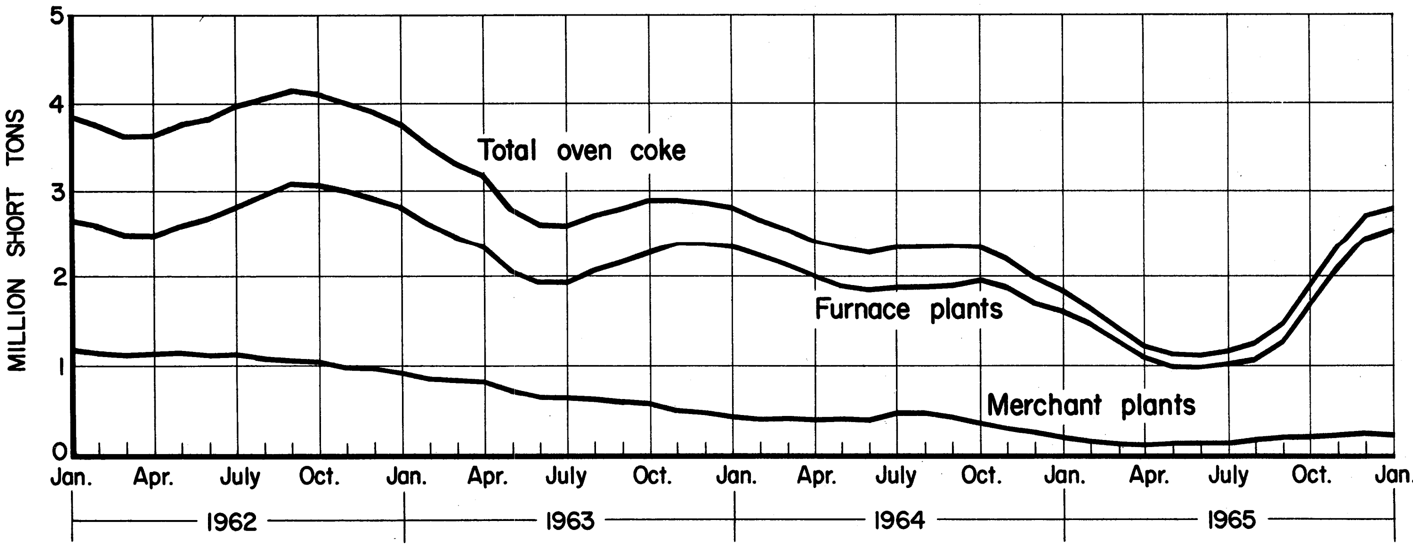

Figure 4.—Producers' stocks of oven coke in the United States, by month.

Table 15.—Distribution of oven and beehive coke and breeze in 1965 [1]
(Short tons)

Consuming State	Coke: To blast furnace plants	Coke: To foundries	Coke: To other industrial plants	Coke: For residential heating	Coke: Total	Breeze
Alabama	3,705,302	261,008	174,792	7,374	4,148,476	234,143
Alaska	—	—	—	—	—	—
Arizona	—	1,840	—	—	1,840	—
Arkansas	—	1,921	1,953	—	3,874	109
California	1,297,747	53,767	51,385	—	1,402,899	79,822
Colorado	672,174	11,638	31,397	1	715,210	70,690
Connecticut	—	27,700	40,599	8,527	76,826	47,643
Delaware	—	18	1,143	—	1,161	535
District of Columbia	—	—	17	—	17	39
Florida	—	2,138	36,197	64	38,399	30,736
Georgia	—	11,548	2,522	1,562	15,632	546
Idaho	—	165	152,504	—	152,669	11,650
Illinois	4,559,404	276,258	45,176	8,653	4,889,491	326,813
Indiana	6,961,239	170,341	97,791	8,489	7,237,860	596,762
Iowa	—	89,122	4,135	413	93,670	9
Kansas	—	11,692	3	9	11,704	2,394
Kentucky	1,144,121	29,106	245,846	4,967	1,424,040	88,363
Louisiana	[2] 977	2,313	49,296	38	52,624	1,510
Maine	—	1,272	17,808	1,650	20,730	—
Maryland	3,634,287	21,361	3,491	—	3,659,139	160,896
Massachusetts	—	44,637	713	19,153	64,503	—
Michigan	4,076,279	854,458	203,568	3,912	5,138,217	184,665
Minnesota	397,705	22,521	13,551	2,035	435,812	37,080
Mississippi	—	728	4	—	732	79
Missouri	—	23,268	19,634	—	42,902	1,862
Montana	—	202	32,866	—	33,068	8,946
Nebraska	—	4,181	7,413	—	11,594	1
Nevada	—	—	—	—	—	—
New Hampshire	—	1,716	—	1,139	2,855	—
New Jersey	[2] 287	77,161	59,271	36,968	173,687	29,084
New Mexico	—	—	105	132	237	254
New York	3,843,738	137,390	41,302	13,041	4,035,471	326,705
North Carolina	—	15,896	21,520	951	38,367	20,775
North Dakota	—	338	2,334	—	2,672	63
Ohio	9,473,065	439,586	467,896	6,012	10,386,559	427,636
Oklahoma	—	4,061	—	—	4,061	7,290
Oregon	[2] 1,232	4,684	32,022	—	37,938	8,697
Pennsylvania	15,306,549	146,409	107,982	15,494	15,576,434	704,858
Rhode Island	—	11,118	148	1,468	12,734	19
South Carolina	—	11,981	20,492	218	32,691	12,303
South Dakota	—	424	—	—	424	—
Tennessee	9,723	69,868	156,605	2,958	239,154	116,463
Texas	823,482	74,297	28,591	489	926,859	74,285
Utah	992,133	11,697	23,209	—	1,027,039	83,032
Vermont	—	3,218	42	697	3,957	—
Virginia	68,107	68,891	125,715	1,600	264,313	2,961
Washington	—	4,301	6,752	—	11,053	3,595
West Virginia	2,902,683	7,868	35,884	16	2,946,451	267,131
Wisconsin	—	168,523	1,422	6,111	176,056	44,438
Wyoming	—	—	3,642	—	3,642	29
Total	59,870,234	3,182,630	2,368,738	154,141	65,575,743	4,014,911
Exported	328,243	117,458	89,391	1,484	536,576	110,696
Grand total	60,198,477	3,300,088	2,458,129	155,625	66,112,319	4,125,607

[1] Based upon reports from producers showing destination and principal end use of coke used and sold. Does not include imported coke which totaled 89,620 tons in 1965.
[2] Blast-furnace-grade coke used for other industrial purposes.

stocks were 27 percent lower than when the year began.

Data on stocks are shown in tables 16 and 17.

VALUE AND PRICE

The average values of oven and beehive coke production, and average receipts for commercial sales, f.o.b. plant, of the different grades of coke are shown in tables 18 and 19. Production values were based upon the prevailing market value as assigned by producers for the coke they consumed; sales prices for the different grades of coke sold were based upon commercial sales, as reported by producers.

There was a 5-percent decrease in the average value assigned to all coke produced in 1965. The average value of $16.89 per ton recorded for oven-coke production was about 7 percent lower than the average for 1957–59, and was the lowest value per ton

Table 16.—Producers' stocks of coke and breeze in the United States on Dec. 31, 1965, by State
(Short tons)

State	Coke				Breeze
	Blast furnace	Foundry	Residential heating and other	Total	
Oven coke:					
Alabama	323,137	14,210	34,641	371,988	52,480
California, Colorado, Utah	250,828	—	—	250,828	7,835
Connecticut, Maryland, New Jersey, New York	366,932	20,473	20,172	407,577	227,813
Illinois	78,461	—	—	78,461	34,678
Indiana	156,008	17,924	12,590	186,522	318,345
Kentucky, Missouri, Tennessee, Texas	30,894	6,539	596	38,029	23,757
Michigan	98,348	1,759	14,128	114,235	5,626
Minnesota and Wisconsin	6,768	30,711	22,255	59,734	33,259
Ohio	206,741	2,485	24,551	233,777	91,556
Pennsylvania	862,539	16,060	11,748	890,347	259,912
West Virginia	69,898	—	—	69,898	3,591
Total 1965	2,450,554	110,161	140,681	2,701,396	1,058,852
At merchant plants	46,017	99,504	110,845	256,366	110,170
At furnace plants	2,404,537	10,657	29,836	2,445,030	948,682
Total 1964	1,695,438	115,796	159,332	1,970,566	1,112,571
Beehive coke:					
Pennsylvania	555	—	—	555	—
Kentucky, Virginia, West Virginia	940	—	55	995	350
Total:					
1965	1,495	—	55	1,550	350
1964	1,010	—	316	1,326	30

Table 17.—Producers' month-end stocks of oven coke in the United States
(Short tons)

Month	At merchant plants		At furnace plants		Total	
	1964	1965	1964	1965	1964	1965
January	447,093	221,146	2,264,672	1,634,261	2,711,765	1,855,407
February	410,554	170,812	2,146,261	1,484,778	2,556,815	1,655,590
March	410,499	147,000	2,048,118	1,276,888	2,458,617	1,423,888
April	392,241	129,786	1,910,015	1,094,743	2,302,256	1,224,529
May	405,581	143,268	1,812,872	992,925	2,218,453	1,136,193
June	395,908	135,993	1,788,316	981,748	2,184,224	1,117,741
July	451,203	160,255	1,825,530	1,016,889	2,276,733	1,177,144
August	451,172	181,096	1,842,343	1,085,482	2,293,515	1,266,578
September	417,106	206,406	1,922,885	1,277,666	2,339,991	1,484,072
October	351,404	227,231	1,970,993	1,690,472	2,322,397	1,917,703
November	304,193	238,705	1,890,459	2,102,608	2,194,652	2,341,313
December	262,087	256,366	1,708,479	2,445,030	1,970,566	2,701,396

for oven-coke production since 1955. Beehive-coke production averaged $14.97 per ton in value, $0.07 per ton lower than in 1964, but $0.27 per ton higher than in 1957–59.

The average value per ton, f.o.b. plant, of all coke sold commercially was $20.63. Receipts for sales of oven coke averaged $21.68 per ton, an increase of $0.95 per ton over 1964, but the beehive value decreased $0.04 per ton to $14.96. Most of the oven-coke increase was attributed to substantially higher f.o.b. prices for all grades of coke. All grades of oven coke except that sold for residential heating also had higher prices than in 1957–59. Except for coke sold to foundries, which decreased 12 percent, all grades of beehive coke also had higher f.o.b. plant prices than in 1964.

The large variance in price for blast-furnace and foundry-oven coke was attributed principally to the lower yields obtained in producing foundry coke, and to larger minimum sizes required to meet foundry-coke specifications. The differences in f.o.b. prices of oven- and beehive-foundry coke were due largely to transportation costs for coal and/or coke.

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Table 18.—Average value per short ton of coke produced in the United States and average receipts per short ton from coke sold (commercial sales)

Year	Value per ton produced			Receipts per ton sold		
	Oven coke	Beehive coke	Total	Oven coke	Beehive coke	Total
1957–59 (average)	$18.14	$14.70	$18.07	$20.06	$14.67	$19.29
1962	18.14	14.96	18.09	21.19	14.95	20.62
1963	17.58	15.38	17.54	21.08	15.48	20.53
1964	17.80	15.04	17.74	20.73	15.00	20.04
1965	16.89	14.97	16.84	21.68	14.96	20.63

Table 19.—Average receipts per short ton of coke sold (commercial sales) in the United States, by use

Year	Oven coke				Beehive coke			
	To blast furnace plants	To foundries	To other industrial plants	For residential heating	To blast furnace plants	To foundries	To other industrial plants	For residential heating
1957–59 (average)	$15.85	$29.39	$15.87	$17.15	$14.84	$16.72	$14.04	$11.64
1962	15.98	30.25	16.37	14.10	14.35	14.15	15.05	15.63
1963	15.40	30.22	15.65	15.27	14.06	14.75	15.99	9.35
1964	15.54	30.43	15.79	16.28	14.34	17.54	15.68	7.83
1965	16.46	30.94	16.41	17.12	14.45	15.40	16.12	10.72

Table 20.—Coke imported for consumption in the United States, by country and by customs district

	1963		1964		1965	
	Short tons	Value	Short tons	Value	Short tons	Value
Country or area:						
North America:						
Canada	142,952	$1,731,011	101,375	$1,329,897	87,724	$1,192,531
Dominican Republic	5	419	—	—	—	—
Mexico	—	—	—	—	49	779
Netherlands Antilles	100	1,071	—	—	—	—
Total	143,057	1,732,501	101,375	1,329,897	87,773	1,193,310
South America:						
British Guiana	—	—	40	608	—	—
Europe:						
Belgium-Luxembourg	220	6,365	220	7,296	—	—
Germany, West	782	81,322	1,651	170,806	1,733	176,266
Netherlands	1,792	112,917	—	—	114	9,162
United Kingdom	6,744	113,942	—	—	—	—
Total	9,538	314,546	1,871	178,102	1,847	185,428
Grand total	152,595	2,047,047	103,286	1,508,607	89,620	1,378,738
Customs District:						
Buffalo	20,896	144,132	25,781	174,588	12,250	57,020
Hawaii	220	6,365	220	7,296	330	11,063
Maine and New Hampshire	96	1,508	89	1,391	57	1,032
Maryland	100	1,071	—	—	—	—
Michigan	39,097	344,347	57	960	108	2,568
Montana and Idaho	66,420	988,659	59,811	906,638	59,158	872,340
New Orleans	9,266	298,725	1,333	139,886	1,403	165,203
New York	—	—	—	—	114	9,162
Puerto Rico	5	419	—	—	—	—
Sabine	52	9,456	318	30,920	—	—
St. Lawrence	363	11,830	292	10,286	472	16,267
Vermont	76	1,258	47	777	51	814
Washington	16,004	239,277	15,338	235,865	15,677	243,269
Total	152,595	2,047,047	103,286	1,508,607	89,620	1,378,738

FOREIGN TRADE

Imports.—Imports of coke are insignificant, and the total imported in 1965 was less than one-half of the amount produced in the United States in a single day. Foreign shipments are important to certain local areas, however, particularly the northwestern parts of the United States which are remote from domestic coke-producing areas.

More than one-half of the coke imported in 1965 and in prior years has entered the United States through the Montana-Idaho customs district. This coke, which is produced in the Canadian Province of British Columbia, was used principally for nonferrous smelting, but some may have been used also in phosphate furnaces in Montana and Idaho. About 17 percent of the total entered the United States through the Washington customs district and most of the remainder entered through the Buffalo district.

The quantities imported from the various countries, as well as ports of entry, are shown in table 20.

Exports.—Exports, which have averaged about 450,000 tons during the past 3 years, increased to nearly 850,000 tons in 1965. This was 60 percent more coke than was exported in 1964, and more than the quantity exported during the 1957–59 period.

The principal foreign market was Canada which received nearly three-fourths of the coke exported. Most of the remainder was shipped to Mexico, Rumania, and Venezuela, although small quantities were shipped also to a number of other South American countries, Japan, and the Philippine Islands.

Canadian shipments, which were about one-third greater than in 1964, increased to 603,000 tons. Although only 82,000 tons was shipped to Venezuela, this quantity was about four times greater than shipments in 1964, and about nine times greater than the average quantity shipped annually during the past 5 years. Shipments to Mexico were about three times larger than in 1964. Rumania, the only European export market, received 60,000 tons of coke.

Exports of coke by country and customs district for 1963, 1964, and 1965 are shown in table 21. The quantity shown is substantially larger than that reported by producers and shown in table 15 because there were additional shipments to foreign countries by export firms.

WORLD PRODUCTION

World production of metallurgical coke in 1965 was estimated at 341 million tons, an increase of 4 percent over the estimated output for 1964. This increase was attributed principally to the larger outputs of China, Italy, Japan, the United States, and the U.S.S.R.

Europe maintained the lead in world production with 62 percent of the output. Although total output for the continent was about 3.5 million tons greater than in 1964, Europe's share of the world total dropped slightly because of production decreases in seven countries.

Output of coke and breeze in the Soviet Union, currently the world's largest producer, was estimated at 75 million tons, more than one-third of the European total and nearly one-fourth of the world total. This was an increase of 3 percent over the 1964 production and a record output for the U.S.S.R. Although Soviet production exceeds that of the United States, the actual difference in outputs of the two countries was 4.1 million tons rather than 8.1 million tons as reflected in table 22, because the United States production figure does not include 4 million tons of breeze produced in 1965.

The United States, with 20 percent of the world output, ranked second, and West Germany, with 14 percent, ranked third. The United States had an 8-percent production increase because of larger demands for blast-furnace coke, but West Germany's output remained at virtually the same level as in 1964.

Other leading coke-producing countries in order of output were the United Kingdom, China, Japan, France, Poland, and Czechoslovakia. Except for Japan, where production increased 16 percent (2.3 million tons), output in these countries did not differ essentially from 1964.

In addition to the high-temperature metallurgical coke produced in conventional slot- and beehive-coke ovens, nearly 50 million tons of other coke was produced at high, medium, and low temperatures in vertical and horizontal retorts and other types of carbonizing equipment. Commonly

Table 21.—Coke exported from the United States, by country and by customs district

	1963		1964		1965	
	Short tons	Value	Short tons	Value	Short tons	Value
Country or area:						
North America:						
Canada	344,456	$6,502,346	449,759	$8,268,152	603,248	$12,452,114
Mexico	13,633	331,863	19,116	537,208	58,006	1,436,017
Panama	584	10,532	411	8,574	103	2,366
West Indies:						
Trinidad and Tobago	59	1,299	173	5,712	110	3,821
Other West Indies	30	1,300	90	2,758	446	26,720
Other North America	38	1,671	—	—	211	6,959
Total	358,800	6,849,011	469,549	8,822,404	662,124	13,927,997
South America:						
Argentina	—	—	10,098	288,480	12,420	221,753
Bolivia	131	2,360	—	—	89	2,025
Brazil	5,730	159,424	7,637	323,270	6,053	161,953
Chile	900	22,743	146	6,464	637	28,213
Colombia	98	2,025	—	—	—	—
Ecuador	243	5,682	213	4,811	75	1,719
Peru	74	3,138	7,221	93,318	7,733	127,235
Venezuela	24,879	265,603	19,962	277,838	81,816	1,136,608
Total	32,055	460,975	45,277	994,181	108,823	1,679,506
Europe:						
Germany, West	446	5,700	—	—	—	—
Italy	15,233	201,836	243	5,789	—	—
Norway	7,388	96,712	—	—	—	—
Portugal	10,039	189,424	—	—	—	—
Rumania	—	—	—	—	59,627	596,292
United Kingdom	632	10,146	139	3,264	—	—
Yugoslavia	13,100	136,900	—	—	—	—
Other	131	1,160	37	696	75	7,476
Total	46,969	641,878	419	9,749	59,702	603,768
Africa:						
Congo (Leopoldville)	28	986	—	—	—	—
Kenya	—	—	41	965	—	—
Libya	—	—	—	—	120	2,760
Nigeria	—	—	—	—	114	11,596
Total	28	986	41	965	234	14,356
Asia:						
India	708	15,101	193	7,485	733	16,138
Japan	12,365	341,643	6,762	195,334	581	9,637
Philippines	300	7,699	1,189	34,093	980	31,066
Other	16	714	22	624	141	16,565
Total	13,389	365,157	8,166	237,536	2,435	73,406
Oceania: Australia	—	—	243	27,762	350	8,045
Grand total	451,241	8,318,007	523,695	10,092,597	833,668	16,307,078
Customs District:						
Buffalo	88,627	1,905,554	148,097	3,151,149	403,120	8,304,560
Chicago	104,193	1,536,822	105,163	1,524,049	27,541	365,128
Dakota	7,431	234,470	9,023	256,981	15,350	438,312
Duluth and Superior	3,191	74,545	2,441	64,855	1,178	32,044
Galveston	138	2,621	470	9,573	1,289	44,909
Laredo	12,152	293,974	17,992	500,172	57,301	1,415,759
Maryland	—	—	298	10,705	1,311	29,559
Michigan	122,373	2,385,340	168,081	2,868,388	127,932	2,715,017
Mobile	1,204	31,035	15,377	238,204	17,792	290,366
Montana and Idaho	441	10,930	—	—	1,169	43,427
New Orleans	1,011	24,193	866	21,009	525	29,085
New York	42,034	505,322	17,309	507,062	2,269	66,477
Ohio	6,522	56,890	—	—	—	—
Oregon	12,290	339,780	6,965	221,921	550	8,937
Philadelphia	35,447	568,332	13,358	276,750	145,255	1,862,741
Sabine	—	—	—	—	3,306	85,105
St. Lawrence	8,552	190,439	13,130	273,320	19,850	357,300
San Diego	1,332	32,544	960	30,416	494	14,111
Washington	3,295	102,912	4,003	133,849	6,628	187,436
Other districts	1,008	22,304	162	4,194	808	16,805
Total	451,241	8,318,007	523,695	10,092,597	833,668	16,307,078

Table 22.—World production of oven and beehive coke (excluding breeze) by country [1]
(Thousand short tons)

Country	1961	1962	1963	1964	1965 [p]
North America:					
Canada [1]	3,900	4,022	4,281	4,343	4,369
Mexico	[r] 861	[r] 860	[r] 843	[r] 866	[e] 890
United States	51,711	51,910	54,278	62,145	66,854
Total	[r] 56,472	[r] 56,792	[r] 59,402	[r] 67,354	72,113
South America:					
Argentina	[r] 369	[r] 383	[r] 347	[r] 497	508
Brazil	771	794	740	[r] 1,005	996
Chile	224	260	274	271	[e] 275
Colombia	358	397	441	463	480
Peru	40	44	44	31	28
Total	[r] 1,762	[r] 1,878	[r] 1,846	[r] 2,267	2,287
Europe:					
Austria	1,965	1,824	1,801	[r] 1,773	1,709
Belgium	7,948	[r] 7,894	7,941	[r] 7,969	8,084
Bulgaria	22	9	141	[r] 518	808
Czechoslovakia	9,410	9,844	10,250	10,385	10,648
Finland	[e] 20	[e] 20	[e] 11	[e] 11	35
France [2]	14,859	14,902	14,842	[r] 15,439	15,047
Germany:					
East [3]	1,135	1,136	1,149	[r] 1,155	[e] 1,213
West [4]	48,992	47,504	46,069	47,691	47,702
Hungary	658	721	728	733	708
Italy	4,296	4,769	5,065	[r] 5,162	6,324
Netherlands [2]	5,020	4,711	4,707	4,976	4,723
Norway	—	—	—	119	265
Poland	13,170	13,859	14,549	[r] 14,871	14,539
Rumania	1,036	1,233	1,258	1,263	1,251
Spain	2,876	3,018	3,034	[r] 2,832	3,154
Sweden	293	379	378	413	[e] 375
U.S.S.R. [2]	64,600	67,163	70,408	[r] 73,063	[e] 75,000
United Kingdom	19,968	17,430	17,408	18,982	19,159
Yugoslavia	[r] 1,133	[r] 1,135	[r] 1,112	[r] 1,200	[5] 1,397
Total	[r] 197,401	[r] 197,551	[r] 200,851	[r] 208,555	212,141
Africa:					
Rhodesia, Southern	212	112	[r] 101	143	[e] 110
South Africa, Republic of	2,420	2,429	2,520	2,636	3,521
United Arab Republic (Egypt) [e]	35	40	40	40	40
Total	[r] 2,667	[r] 2,581	[r] 2,661	[r] 2,819	3,671
Asia:					
China, Mainland [e]	16,500	16,500	16,500	16,500	17,600
India	8,264	[r] 7,770	[r] 8,098	[r] 8,667	9,457
Iran [6]	22	14	[e] 22	[e] 22	[e] 28
Japan	12,030	12,729	12,398	14,256	16,536
Korea, North [e]	990	1,200	1,300	1,500	1,800
Taiwan	22	15	47	55	60
Turkey	580	565	907	947	1,370
Total	[r] 38,408	[r] 38,793	[r] 39,272	[r] 41,947	46,851
Oceania:					
Australia	3,038	3,106	3,192	[r] 3,408	3,573
New Caledonia [e]	77	77	77	77	77
New Zealand	7	7	7	7	[e] 10
Total	3,122	3,190	3,276	[r] 3,492	3,660
World total (estimate)	[e] 299,832	[r] 300,785	[r] 307,308	[r] 326,434	340,723

[e] Estimate. [p] Preliminary. [r] Revised.
[1] Includes breeze and a negligible amount of gashouse coke.
[2] Includes breeze.
[3] High-temperature coke from lignite.
[4] Including electrode coke but excluding a small amount of low-temperature coke.
[5] Includes coke of all sizes.
[6] Year ended March 20 following that stated.

Table 23.—World production of gashouse, low- and medium-temperature coke (excluding breeze), by country [1]

(Thousand short tons)

Country [2]	1961	1962	1963	1964	1965 p
North America:					
United States, retort, low- and medium-temperature	W	164	160	203	149
Total e,2	130	275	r 215	r 243	172
South America:					
Brazil	314	e 310	e 310	e 310	241
Chile	e 94	e 94	109	91	e 100
Uruguay	25	25	23	23	22
Total	r 433	r,e 430	r,e 440	r,e 425	363
Europe:					
Austria	280	347	378	r 345	317
Czechoslovakia:					
Gashouse	565	571	497	336	354
Lignite	2,375	2,327	2,330	e 2,300	e 2,300
Denmark	446	461	453	r 386	383
Finland	e 130	r,e 165	e 170	e 150	121
France:					
Gashouse	474	272	152	67	22
Low-temperature	306	297	299	326	266
Germany:					
East:					
Gashouse [3]	3,400	3,441	3,596	r 3,746	e 3,640
Lignite	7,314	7,308	7,194	r 7,231	e 7,495
West:					
Gashouse	5,454	5,467	5,390	5,415	4,578
Lignite	662	661	661	657	637
Low-temperature	98	114	111	94	21
Greece	25	24	23	r 18	e 15
Hungary	534	559	535	r 517	e 525
Ireland	103	97	110	e 115	e 115
Italy	862	855	r 799	r 597	424
Luxembourg	40	40	40	31	e 35
Netherlands [4]	257	220	195	r 120	108
Norway	r 42	r 43	r 40	r 25	e 15
Poland:					
Gashouse	1,122	1,194	r 1,274	r 1,312	1,389
Low-temperature	e 220	e 275	280	r 276	287
Portugal	44	34	28	11	4
Spain	279	256	219	r 198	97
Sweden	661	642	628	r,e 605	e 550
Switzerland	529	547	r 582	r 517	369
United Kingdom	10,975	10,886	10,938	9,900	8,691
Yugoslavia	19	20	19	r 19	20
Total e,2	40,600	41,000	r 40,800	r 39,200	36,700
Africa:					
Algeria	68	e 77	e 66	e 45	e 40
South Africa, Republic of	111	122	139	148	178
United Arab Republic (Egypt) e	33	39	39	39	45
Total	212	238	244	232	263
Asia:					
Hong Kong [4]	10	19	17	14	14
India:					
Gashouse	140	138	e 130	e 75	e 70
Low-temperature	1,989	2,313	2,525	r 2,433	2,811
Japan:					
Gashouse	4,185	3,807	3,719	4,102	4,045
Low-temperature e	83	83	83	77	77
Taiwan	r 183	r 105	r 209	r 216	224
Turkey:					
Gashouse	133	168	186	191	128
Low-temperature	91	93	87	87	79
Total e,2	r 7,290	r 7,200	r 7,430	r 7,660	7,920

Table 23.—World production of gashouse, low- and medium-temperature coke (excluding breeze), by country [1]—(Continued)

(Thousand short tons)

Country [2]	1961	1962	1963	1964	1965 [p]
Oceania:					
Australia [5]	856	853	778	r 776	e 770
New Zealand [6]	86	97	86	88	76
Total	942	950	864	r 864	e 845
World total (estimate) [2]	r 49,610	r 50,090	r 49,990	r 48,620	46,260

e Estimate. p Preliminary. r Revised. W Withheld to avoid disclosing individual company confidential data.

[1] Gashouse coke unless otherwise specified. Data do not add to totals shown because of rounding.

[2] Production data for Ceylon, China, Malaysia, Mexico, Rumania, and U.S.S.R. are not available; estimates for these countries included in the total. A negligible amount is produced in Belgium, Canada, and Libya.

[3] Includes high-temperature coke.

[4] Includes breeze.

[5] Year ended June 30 of year stated.

[6] Year ended March 31, of year following that stated.

referred to as "soft," this coke, which is not suitable for most metallurgical applications, was used principally for domestic heating, chemical processing, and the production of producer and water gas. When produced as char, the material generally was briquetted and then used for domestic fuel.

Europe produced four-fifths of the world's soft coke, and Asia supplied most of the remainder. The leading European producers were East Germany and the United Kingdom, with a combined output equal to 43 percent of the world total and 54 percent of Europe's production. The major part of East Germany's output of soft coke was principally carbonized lignite briquets. Production in the United Kingdom consisted mainly of carbonized briquets or semicoke produced in retorts from bituminous coal. Both countries used these fuels principally for domestic heating. Other countries with relatively large outputs were West Germany, Japan, Czechoslovakia, India, and Poland. Less than 150,000 tons of soft coke was produced in the United States.

Table 23 shows production of gashouse, low-, and medium-temperature coke in the various countries.

COKE OVENS

SLOT OVENS

A total of 65 oven-coke plants with 14,357 ovens were in existence on December 31, 1965, compared with 66 plants with 14,639 ovens in existence when the year began. The decrease of 282 ovens was caused partially by the abandonment at the end of the year of the Wyandotte, Mich., plant of the Wyandotte Chemicals Co., which was built in 1927 and was composed of 39 Koppers-Becker ovens. Most of the decrease, however, was caused by the shutdown of three batteries of 192 ovens at the U.S. Steel Co. plant in Clairton, Pa., and the retirement of 51 ovens at the Alan Wood Steel Co. plant in Swedeland, Pa.

There was moderate activity in the area of oven reconstruction during the year, and on December 31 a total of 130 slot ovens were under construction. Of this number, 55 were being built at the Alan Wood plant and most of the remainder, at the Allied Chemical Corp. plant in Ashland, Ky.

Of the total number of ovens in existence at the end of 1965, nearly one-half were Koppers-Becker, nearly one-fourth were Wilputte, and about one-fifth were Koppers. Most of the remainder were the Semet-Solvay type.

The durability of slot ovens is indicated by the fact that nearly 40 percent of the ovens currently in existence have been in service more than 25 years. Ovens are continually being replaced, however, and 40 percent have been in service no more than 15 years. Most of these ovens were constructed during and in the period immediately following the Korean emergency. Only 3 percent of the ovens in existence were built within the past 5 years.

Table 24.—Slot ovens completed and abandoned in the United States in 1965, by State

State	Plants in existence Dec. 31 [1]	Ovens: New	Ovens: Abandoned during year [2]	Ovens: In existence Dec. 31	Ovens: Under construction Dec. 31
Alabama	7	—	—	1,516	—
California	1	—	—	315	—
Colorado	1	—	—	206	—
Connecticut	1	—	—	70	—
Illinois	6	—	—	568	—
Indiana	5	—	—	2,218	—
Kentucky	1	—	—	196	70
Maryland	1	—	—	757	—
Michigan	3	—	39	739	—
Minnesota	2	—	—	180	—
Missouri	1	—	—	58	—
New Jersey	1	—	—	120	5
New York	3	—	—	855	—
Ohio	12	—	—	1,836	—
Pennsylvania	12	—	243	3,419	55
Tennessee	1	—	—	44	—
Texas	2	—	—	140	—
Utah	1	—	—	252	—
West Virginia	3	—	—	668	—
Wisconsin	1	—	—	200	—
Total 1965	65	—	282	14,357	130
At merchant plants	17	—	39	1,855	75
At furnace plants	48	—	243	12,502	55
Total 1964	66	165	112	14,639	—

[1] Excludes plants retired permanently during year.
[2] Includes ovens dismantled for rebuilding.

Table 25.—Number of slot ovens in the United States on Dec. 31, 1965, by State and kind

State	Koppers	Koppers-Becker	Semet-Solvay	Wilputte	All others	Total
Alabama	510	633	180	130	[1] 63	1,516
California	—	315	—	—	—	315
Colorado	60	146	—	—	—	206
Connecticut	—	70	—	—	—	70
Illinois	—	238	—	330	—	568
Indiana	340	1,166	60	652	—	2,218
Kentucky	—	—	120	76	—	196
Maryland	—	757	—	—	—	757
Michigan	—	229	362	148	—	739
Minnesota	65	115	—	—	—	180
Missouri	18	—	—	—	[2] 40	58
New Jersey	55	65	—	—	—	120
New York	135	236	120	364	—	855
Ohio	667	586	122	461	—	1,836
Pennsylvania	660	1,546	88	1,125	—	3,419
Tennessee	—	—	24	20	—	44
Texas	—	140	—	—	—	140
Utah	—	252	—	—	—	252
West Virginia	154	514	—	—	—	668
Wisconsin	100	—	100	—	—	200
Total 1965	2,764	7,008	1,176	3,306	103	14,357
At merchant plants	398	430	624	363	40	1,855
At furnace plants	2,366	6,578	552	2,943	63	12,502
Total 1964	3,007	7,047	1,176	3,306	103	14,639

[1] Otto.
[2] Simon-Carves.

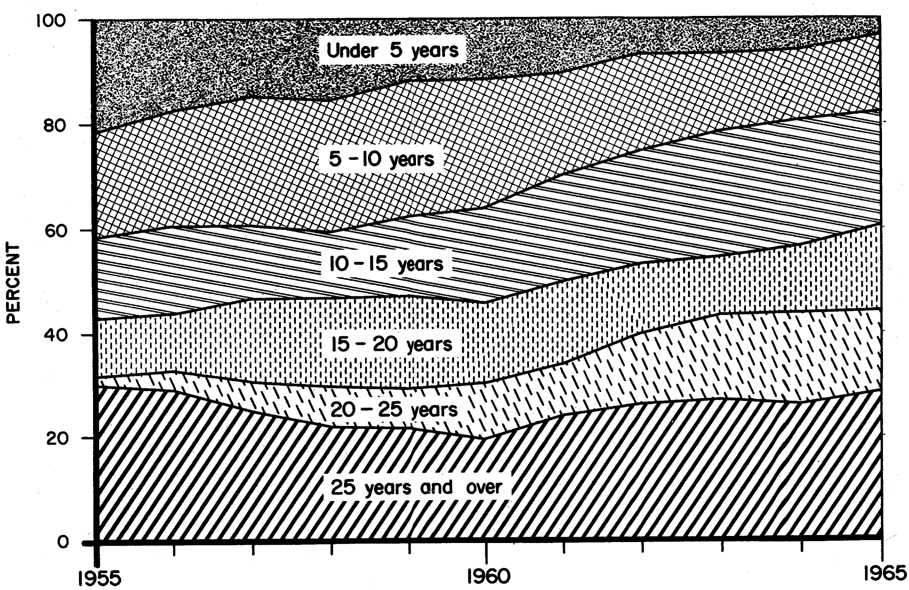

Figure 5.—Age of slot ovens in the United States.

Table 26.—Age of slot ovens in the United States on Dec. 31, 1965 [1]

Age	At merchant plants		At furnace plants		Total	
	Number of ovens	Percent of total	Number of ovens	Percent of total	Number of ovens	Percent of total
Under 5 years	78	4.2	363	2.9	441	3.1
From 5 to 10 years	—	—	2,113	16.9	2,113	14.7
From 10 to 15 years	165	8.9	2,987	23.9	3,152	21.9
From 15 to 20 years	57	3.1	2,323	18.6	2,380	16.6
From 20 to 25 years	112	6.0	2,098	16.8	2,210	15.4
From 25 to 30 years	163	8.8	1,124	9.0	1,287	9.0
From 30 to 35 years	23	1.2	69	.5	92	.6
From 35 to 40 years	318	17.2	111	.9	429	3.0
40 years and over	939	50.6	1,314	10.5	2,253	15.7
Total	1,855	100.0	12,502	100.0	14,357	100.0

[1] Age dates from first entry into operation or from last date of rebuilding.

Table 27.—Beehive ovens completed and abandoned in the United States in 1965, by State

State	Plants in existence Dec. 31	Ovens: New or rebuilt	Ovens: Abandoned during year	Ovens: In existence Dec. 31	Ovens: Under construction Dec. 31
Kentucky	1	—	—	200	—
Pennsylvania	12	—	1,600	2,200	—
Virginia	6	—	118	759	—
West Virginia	2	80	—	274	—
Total:					
1965	21	80	[1] 1,718	3,433	—
1964	26	300	[1] 136	5,071	—

[1] Idle and not expected to resume production; removed from list of available ovens.

Slot ovens in existence, constructed, and abandoned in the various States in 1965 are shown in table 24. The relative lengths of time that ovens in existence have been in service are shown in table 26.

BEEHIVE OVENS

A decline in demand for beehive coke in the latter part of 1965 resulted in the abandonment of 1,718 beehive ovens and at the end of the year there were only 3,433 beehive ovens in existence compared with 5,071 ovens when the year began. This figure, however, does not represent the total number of ovens capable of producing coke, as there are many beehive ovens that could be reactivated with a minimum of repairs if there were an increased demand for metallurgical coke and if coking coals were available.

Of the 21 beehive plants in existence at the end of the year, 20 produced coke in 1965. However, only 12 of the 21 plants, were in operation at the end of the year. Of the total number in existence, 12 were in Pennsylvania, 6 were in Virginia, 2 in West Virginia, and 1 in Kentucky. There were no beehive ovens constructed in either 1964 or 1965.

Table 27 shows the number of beehive plants and ovens in existence, built, and abandoned in 1965.

COKING COALS

QUANTITY AND VALUE OF COAL CARBONIZED

A total of 92 million tons of bituminous coal was carbonized in coke ovens in 1965. This was approximately one-sixth of the total bituminous coal production and the second largest amount of bituminous coal consumed by a single industry. (The electric utility industry uses about one-half of the annual bituminous coal output.) In addition to bituminous coal, 507,000 tons of anthracite was consumed in the manufacture of coke. Anthracite, used principally by producers of foundry coke, was blended with bituminous coal and the mix was carbonized to obtain coke with special properties.

The average value per ton for all coals carbonized at oven-coke plants was $9.51 compared with an average value of $5.41 per ton for the coal carbonized at beehive ovens. The difference in value was attributed mainly to transportation charges for coal shipped to oven plants as virtually all beehive plants are located at the mines where they obtain their coal. In some instances transportation charges exceed the value of the coal at the mine and this partially accounts for the high values of coals used at plants in the Western States, most of which receive shipments of low-volatile coals from the East.

There was no appreciable change in the overall average values of the coals carbonized at either oven- or beehive-coke plants. Although most oven-coke plants reported slightly higher coal costs than in 1964, the bulk of the $0.23-per-ton increase in the average value of the coal carbonized at oven plants was due to significantly higher coal costs in Alabama. The $0.09-per-ton increase in the value of the coal carbonized at beehive plants was caused by slightly higher coal prices in all three of the States that produced beehive coke.

An overall average of 1.42 tons of coal, valued at $13.51, was required for each ton of oven coke produced in 1965. Beehive ovens required an average of 1.62 tons of coal per ton of coke production, but coal costs averaged only $8.79 per ton of coke because of the lower value of the coal delivered to beehive ovens.

Tables 28–32 present data on the coals carbonized at oven and beehive plants.

PREPARATION

Washed and Unwashed.—The manufacture of high-quality coke requires coals with low ash and sulfur content, and most of the coals carbonized in 1965 were cleaned before they were used in order to reduce these impurities. Cleaning, which generally is accomplished by wet methods, is usually termed "washing", and cleaned coal is referred to as having been "washed".

Ninety-seven percent of the coal charged into slot ovens and 81 percent of that carbonized in beehive ovens in 1965 was washed. Although more coal was carbonized at oven-coke plants than in 1964, ap-

Table 28.—Quantity and value at ovens of coal carbonized in the United States in 1965, by State

State	Coal carbonized			Coal per ton of coke	
	Short tons	Value		Short tons	Value
		Total	Average		
Oven coke:					
Alabama	7,256,176	$70,693,988	$9.74	1.32	$12.88
California, Colorado, Utah	5,062,990	63,104,405	12.46	1.59	19.80
Connecticut, Maryland, New Jersey, New York	11,893,318	131,989,709	11.10	1.41	15.66
Illinois	3,607,147	32,609,358	9.04	1.44	13.02
Indiana	11,996,819	120,933,935	10.08	1.44	14.54
Kentucky, Missouri, Tennessee, Texas	2,916,509	26,148,925	8.97	1.41	12.61
Michigan	5,404,173	53,235,456	9.85	1.36	13.38
Minnesota and Wisconsin	1,448,568	15,458,560	10.67	1.30	13.83
Ohio	10,890,945	96,508,059	8.86	1.42	12.58
Pennsylvania	26,976,822	230,411,973	8.54	1.43	12.18
West Virginia	5,139,770	39,795,024	7.74	1.46	11.30
Total 1965	92,593,237	880,889,392	9.51	1.42	13.51
At merchant plants	9,126,540	88,443,327	9.69	1.37	13.25
At furnace plants	83,466,697	792,446,065	9.49	1.43	13.54
Total 1964	87,224,479	809,422,873	9.28	1.43	13.29
Beehive coke:					
Pennsylvania	1,421,662	7,903,090	5.56	1.62	8.98
Kentucky and Virginia	1,271,039	6,663,425	5.24	1.64	8.57
Total:					
1965	2,692,701	14,566,515	5.41	1.63	8.79
1964	2,025,415	10,766,852	5.32	1.64	8.71

Table 29.—Bituminous coal carbonized in coke ovens in the United States, by month

(Short tons)

Month	1957–59 (average)			1964			1965		
	Slot	Beehive	Total	Slot	Beehive	Total	Slot	Beehive	Total
Jan.	7,974,200	220,300	8,194,500	6,656,800	139,600	6,796,400	7,961,600	284,800	8,246,400
Feb.	7,312,300	213,300	7,525,600	6,411,800	135,300	6,547,100	7,305,800	261,500	7,567,300
Mar.	8,125,900	251,200	8,377,100	6,868,100	154,100	7,022,200	8,147,900	311,800	8,459,700
Apr.	7,619,800	230,500	7,850,300	6,901,100	150,900	7,052,000	7,894,300	263,300	8,157,600
May	7,833,800	198,000	8,031,800	7,388,600	154,600	7,543,200	8,206,600	237,900	8,444,500
June	7,569,600	180,700	7,750,300	7,221,000	133,200	7,354,200	7,852,600	282,600	8,135,200
July	6,531,200	138,300	6,669,500	7,337,000	114,500	7,451,500	7,913,200	254,900	8,168,100
Aug.	5,892,900	139,900	6,032,800	7,308,000	155,500	7,463,500	7,867,700	266,000	8,133,700
Sept.	5,849,300	132,400	5,981,700	7,311,000	182,300	7,493,300	7,362,900	149,700	7,512,600
Oct.	6,152,600	127,100	6,279,700	7,777,200	210,000	7,987,200	7,337,000	128,400	7,465,400
Nov.	7,116,800	129,300	7,246,100	7,646,200	233,200	7,879,400	6,966,200	116,700	7,082,900
Dec.	7,842,200	144,300	7,986,500	7,905,400	262,200	8,167,600	7,270,200	135,100	7,405,300
Total	85,820,600	2,105,300	87,925,900	86,732,200	2,025,400	88,757,600	92,086,000	2,692,700	94,778,700

Table 30.—Anthracite carbonized at oven-coke plants in the United States, by month

(Short tons)

Month	1957–59 (average)	1962	1963	1964	1965
January	29,700	35,100	37,500	42,400	40,500
February	28,200	32,100	36,300	39,100	36,800
March	29,900	34,300	42,900	42,200	46,400
April	29,100	34,600	35,500	41,300	43,300
May	30,200	31,500	38,900	41,300	42,100
June	26,000	30,300	36,200	39,600	39,900
July	24,800	30,600	34,100	42,800	36,000
August	25,600	34,600	34,400	35,300	41,400
September	26,300	35,000	35,600	41,500	41,300
October	29,800	39,600	39,200	43,400	46,400
November	29,000	38,700	36,200	41,700	46,200
December	29,000	43,100	43,700	41,700	46,900
Total	337,600	419,500	450,500	492,300	507,200

Table 31.—Value of coal and products per short ton of coal carbonized in the United States

Year	Oven coke					Beehive coke	
	Value of coal per ton	Value per ton of coal: Coke produced	Value per ton of coal: Breeze produced	Value per ton of coal: Coal-chemical materials used or sold [1]	Value per ton of coal: Total	Value of coal per ton	Value per ton of coal
1957–59 (average)	$9.90	$12.75	$0.31	$3.84	$16.90	$6.12	$8.76
1962	9.85	12.64	.32	3.61	16.57	5.31	9.07
1963	9.49	12.25	.33	3.33	15.91	5.14	9.26
1964	9.28	12.43	.30	3.34	16.07	5.32	9.18
1965	9.51	11.89	.30	3.36	15.55	5.41	9.21

[1] Includes value of surplus gas used and tar and pitch-of-tar burned.

Table 32.—Average value per short ton of coal carbonized at oven-coke plants in the United States, by State

State	1957–59 (average)	1962	1963	1964	1965
Alabama	$8.13	$8.35	$8.29	$7.75	$9.74
California, Colorado, Utah	12.24	12.58	12.86	12.59	12.46
Connecticut, Maryland, New Jersey, New York	[1] 11.87	12.31	11.59	11.24	11.10
Illinois	10.65	9.66	9.35	9.23	9.04
Indiana	11.23	11.22	10.60	10.02	10.08
Kentucky, Missouri, Tennessee, Texas	10.60	9.07	9.06	9.35	8.97
Michigan	10.22	10.05	9.87	9.86	9.85
Minnesota and Wisconsin	11.46	11.13	11.02	10.73	10.67
Ohio	9.79	8.94	8.72	9.00	8.86
Pennsylvania	8.56	8.82	8.45	8.09	8.54
West Virginia	7.74	7.64	7.47	7.66	7.74
Average	9.90	9.85	9.49	9.28	9.51
Value of coal per ton of coke	14.08	14.14	13.62	13.29	13.51

[1] Includes Massachusetts.

proximately the same percent of the total was cleaned because oven-coke plants obtained their additional coal requirements from the same sources. Beehive plants carbonized more coal also, but a lower percent of the total was washed in 1965 because a number of reactivated ovens used local coals produced at mines without cleaning facilities.

The production of increased quantities of coal by modern mining methods has resulted in the cleaning of larger percentages of the coal shipped to coke plants and, in 1965, 96.1 percent of all coals carbonized was washed, compared with 76.9 percent cleaned in 1957–59. All of the unwashed coals were used at furnace oven-coke plants and in beehive ovens. The bulk of the unwashed coals, which were produced mainly in Pennsylvania and West Virginia, had low ash and sulfur contents and did not require cleaning.

Detailed data on the use of washed and unwashed coals in the various States are shown in table 33; trends in the use of washed and unwashed coals are presented in table 34.

Blending.—The blending of coals is standard practice at oven-coke plants because individual coals do not possess all of the properties required for the production of high-quality coke in slot ovens. In general, blending is used as a means to improve the chemical and physical properties of the coke, control the pressure developed in slot ovens during carbonization, regulate

Table 33.—Washed and unwashed coal carbonized in the United States in 1965, by State in which used

(Short tons)

State	Bituminous coal			Anthracite	Grand total
	Washed	Unwashed	Total		
Oven coke:					
Alabama	7,218,480	—	7,218,480	37,696	7,256,176
California, Colorado, Utah	4,951,343	111,647	5,062,990	—	5,062,990
Connecticut, Maryland, New Jersey, New York	10,136,989	1,709,277	11,846,266	47,052	11,893,318
Illinois	3,117,137	479,264	3,596,401	10,746	3,607,147
Indiana	11,914,355	—	11,914,355	82,464	11,996,819
Kentucky, Missouri, Tennessee, Texas	2,429,640	425,673	2,855,313	61,196	2,916,509
Michigan	5,294,839	—	5,294,839	109,334	5,404,173
Minnesota and Wisconsin	1,421,913	—	1,421,913	26,655	1,448,568
Ohio	10,429,063	377,366	10,806,429	84,516	10,890,945
Pennsylvania	26,836,209	93,065	26,929,274	47,548	26,976,822
West Virginia	5,139,770	—	5,139,770	—	5,139,770
Total 1965	88,889,738	3,196,292	92,086,030	507,207	92,593,237
At merchant plants	8,709,484	—	8,709,484	417,056	9,126,540
At furnace plants	80,180,254	3,196,292	83,376,546	90,151	83,466,697
Total 1964	82,442,866	4,289,295	86,732,161	492,318	87,224,479
Beehive coke:					
Pennsylvania	1,072,861	348,801	1,421,662	—	1,421,662
Kentucky, Virginia, West Virginia	1,105,836	165,203	1,271,039	—	1,271,039
Total:					
1965	2,178,697	514,004	2,692,701	—	2,692,701
1964	1,812,550	212,865	2,025,415	—	2,025,415

Table 34.—Washed and unwashed bituminous coal carbonized in the United States

(Short tons)

Year	Washed coal			Unwashed coal			Total coal carbonized	Percent of total washed
	In slot ovens	In beehive ovens	Total	In slot ovens	In beehive ovens	Total		
1957–59 (average)	66,219,149	1,429,859	67,649,008	19,601,434	675,484	20,276,918	87,925,926	76.9
1962	62,026,666	1,124,809	63,151,475	10,896,661	214,053	11,110,714	74,262,189	85.0
1963	71,065,392	1,423,677	72,489,069	4,954,137	188,904	5,143,041	77,632,110	93.4
1964	82,442,866	1,812,550	84,255,416	4,289,295	212,865	4,502,160	88,757,576	94.9
1965	88,889,738	2,178,697	91,068,435	3,196,292	514,004	3,710,296	94,778,731	96.1

the yield of products, and broaden the use of inferior coals. Standard practice is to blend relatively small proportions of low-volatile coal with high-volatile coal. High-volatile coals are not used alone because they produce weaker coke and lower yields. Low-volatile coals improve the yield and physical structure of the coke, but the proportions of low-volatile coal that can be used is limited, because low-volatile coals are highly expanding and if used alone, or in large proportions in the coal mix, would damage the oven walls when coke was discharged from the ovens. In addition to high- and low-volatile coals, some plants also used medium-volatile coals or other materials such as anthracite or coal-tar pitch. Medium-volatile coals are used in conjunction with high- and low-volatile coals to produce a mix with the desired volatile-matter content, while additions of anthracite and coal-tar pitch impart special properties to the resulting coke.

Blending also permits the use of certain coking coals that could not be used alone for producing coke, such as those containing relatively large amounts of sulfur. Such coals can be blended with low-sulfur coals to the extent that the coal mix contains no more total sulfur than that contained in the coals normally used for producing high-quality coke.

The proportions of high-, medium-, and low-volatile coals used by the coke industry have not varied much in the past two decades, but there are wide variations in the proportions of the different types used at individual plants. West Virginia plants and those in the Far West used the largest percentages of high-volatile coals in 1965, while plants in Minnesota and Wisconsin used higher percentages of low-volatile coals. Compared with furnace plants, merchant plants used larger proportions of low-volatile coals because this type improves the strength of foundry coke, which makes up a major part of the output of merchant plants.

Table 35 shows the average volatile-matter content of the coals carbonized at oven-coke plants and table 36 shows the volatile-matter content of the coals received by oven-coke plants in the various States.

SOURCES

Although 23 States produced bituminous coal in 1965, only 10 shipped coal to coke plants. Of this number, five States (Alabama, Kentucky, Pennsylvania, Virginia, and West Virginia) supplied 92 percent of the total shipped. The remainder was supplied by Colorado, Illinois, New Mexico, Oklahoma, and Utah.

Of the coals received by oven-coke plants, 41 percent was produced in West Virginia and 30 percent in Pennsylvania. West Virginia shipments were principally medium- and low-volatile coals from the Pocahontas field, and high-volatile coals from the Fairmont and Kanawha fields. Shipments were made also from six other producing fields in West Virginia. Pennsylvania shipments were principally high-volatile coals from the Connellsville, Freeport, Pittsburgh, and Westmoreland fields, and low-volatile coals from the Central Pennsylvania field.

Illinois supplied more than 1 million tons of high-volatile coal to coke plants in Illinois and Indiana. This coal was blended with larger proportions of high-rank Eastern coals that were shipped principally from Kentucky, Virginia, and West Virginia.

Most of the coals carbonized in California, Colorado, and Utah were produced in the latter two Western States. In most instances, plants in the Western States also received shipments of West Virginia low-volatile coals that were used for blending.

Tables 37 and 38 show the origin of the coals received by oven-coke plants in 1965.

Table 35.—Average volatile content of bituminous coal carbonized by oven-coke plants in the United States

Year	High		Medium		Low		Total	
	Short tons	Volatile content (percent)	Short tons	Volatile content (percent)	Short tons	Volatile content (percent)	Short tons	Volatile content (percent)
1957–59 (average)	56,499,763	34.9	11,447,103	26.0	17,873,717	17.7	85,820,583	30.1
1962	47,846,051	35.3	10,469,256	26.1	14,608,020	17.6	72,923,327	30.4
1963	49,825,740	35.4	10,657,200	26.1	15,536,589	17.4	76,019,529	30.4
1964	58,011,780	35.2	11,151,584	25.9	17,568,797	17.5	86,732,161	30.4
1965	61,725,145	35.2	11,791,203	25.9	18,569,682	17.8	92,086,030	30.5

Table 36.—Coal received by oven-coke plants in the United States in 1965, by consuming State and volatile content [1]

(Short tons)

Consuming State	High-volatile		Medium-volatile		Low-volatile		Total coal receipts
	Quantity	Percent of total	Quantity	Percent of total	Quantity	Percent of total	
Alabama	1,065,249	14.6	5,464,016	74.6	794,310	10.8	7,323,575
California, Colorado, Utah	4,470,284	80.8	895,716	16.2	165,736	3.0	5,531,736
Connecticut, Maryland, New Jersey, New York	8,430,978	67.0	541,599	4.3	3,601,989	28.7	12,574,566
Illinois	2,576,711	72.3	193,291	5.4	793,115	22.3	3,563,117
Indiana	6,718,435	57.4	2,180,014	18.6	2,806,683	24.0	11,705,132
Kentucky, Missouri, Tennessee, Texas	1,872,901	63.1	500,352	16.9	591,631	20.0	2,964,884
Michigan	3,436,854	64.0	305,610	5.7	1,627,153	30.3	5,369,617
Minnesota and Wisconsin	653,624	44.6	197,192	13.5	613,153	41.9	1,463,969
Ohio	8,255,542	75.7	222,771	2.0	2,434,041	22.3	10,912,354
Pennsylvania	20,080,926	73.7	1,594,499	5.8	5,582,049	20.5	27,257,474
West Virginia	4,314,495	83.7	—	—	839,469	16.3	5,153,964
Total 1965	61,875,999	66.0	12,095,060	12.9	19,849,329	21.1	93,820,388
At merchant plants	4,516,587	49.3	1,353,260	14.7	3,296,940	36.0	9,166,787
At furnace plants	57,359,412	67.8	10,741,800	12.7	16,552,389	19.5	84,653,601
Total 1964	59,230,772	65.6	11,500,321	12.7	19,605,320	21.7	90,336,413

[1] Volatile matter on moisture-free basis: High-volatile—over 31 percent; medium-volatile—22-31 percent; and low-volatile—14-22 percent.

Table 37.—Origin of coal received by oven-coke plants in the United States in 1965, by producing field and volatile content

(Short tons)

State and field [1] where coal was produced	Volatile content [2]			Total
	High	Medium	Low	
Alabama	437,768	5,469,959	—	5,907,727
Colorado	1,533,858	740,500	—	2,274,358
Illinois	1,463,451	—	—	1,463,451
Kentucky:				
Elkhorn	6,566,355	—	—	6,566,355
Harlan	2,798,883	—	—	2,798,883
New Mexico	402,121	—	—	402,121
Oklahoma	323,839	280,368	—	604,207
Pennsylvania:				
Anthracite	—	—	471,777	471,777
Bituminous:				
Central Pennsylvania	—	351,129	2,971,538	3,322,667
Connellsville	5,653,308	—	—	5,653,308
Freeport	2,391,772	17,387	—	2,409,159
Pittsburgh	15,866,559	17,387	—	15,883,946
Somerset	—	—	478,224	478,224
Westmoreland	179,024	—	—	179,024
Utah	2,516,155	—	—	2,516,155
Virginia:				
Buchanan	177,591	562,532	11,585	751,708
Pocahontas	—	—	644,472	644,472
Southwestern	1,668,372	1,042,466	148,876	2,859,714
West Virginia:				
Coal River	565,012	—	—	565,012
Fairmont	6,920,336	—	—	6,920,336
Kanawha	6,074,463	—	—	6,074,463
Kenova-Thacker	1,559,859	—	—	1,559,859
Logan	4,289,398	316,479	—	4,605,877
New River	—	—	328,419	328,419
Pocahontas	—	1,774,513	12,993,314	14,767,827
Webster-Gauley	487,875	1,379,534	—	1,867,409
Winding Gulf	—	142,806	1,801,124	1,943,930
Total	61,875,999	12,095,060	19,849,329	93,820,388

[1] As defined by the U.S. Coal Commission of 1922.

[2] Volatile matter on moisture-free basis: High-volatile—over 31 percent; medium-volatile—22 to 31 percent; and low-volatile—14 to 22 percent.

Table 38.—Origin of coal received by oven-coke plants in the United States in 1965, by State
(Short tons)

Consuming State	Coal produced in—					
	Alabama	Colorado	Illinois	Kentucky	New Mexico	Oklahoma
Alabama	5,721,862	—	—	172,319	—	—
California, Colorado, Utah	—	2,274,358	18,150	—	402,121	127,794
Connecticut, Maryland, New Jersey, New York	—	—	—	1,515,267	—	—
Illinois	—	—	1,074,477	1,336,229	—	—
Indiana	—	—	370,824	3,747,230	—	—
Kentucky, Missouri, Tennessee, Texas	185,865	—	—	—	—	476,413
Michigan	—	—	—	1,607,816	—	—
Minnesota and Wisconsin	—	—	—	217,174	—	—
Ohio	—	—	—	674,189	—	—
Pennsylvania	—	—	—	95,014	—	—
West Virginia	—	—	—	—	—	—
Total 1965	5,907,727	2,274,358	1,463,451	9,365,238	402,121	604,207
At merchant plants	643,569	—	—	6,262	—	—
At furnace plants	5,264,158	2,274,358	1,463,451	9,358,976	402,121	604,207
Total 1964	5,983,187	2,001,784	1,286,671	9,326,765	380,303	585,222

	Coal produced in—Continued				
	Pennsylvania	Utah	Virginia	West Virginia	Total
Alabama	35,856	—	216,216	1,177,322	7,323,575
California, Colorado, Utah	—	2,516,155	—	193,158	5,531,736
Connecticut, Maryland, New Jersey, New York	4,830,972	—	674,027	5,554,300	12,574,566
Illinois	9,887	—	101,783	1,040,741	3,563,117
Indiana	73,959	—	977,846	6,535,273	11,705,132
Kentucky, Missouri, Tennessee, Texas	74,425	—	118,442	2,109,739	2,964,884
Michigan	108,646	—	318,097	3,335,058	5,369,617
Minnesota and Wisconsin	32,772	—	54,829	1,159,194	1,463,969
Ohio	4,874,563	—	527,772	4,835,830	10,912,354
Pennsylvania	14,778,691	—	1,141,807	11,241,962	27,257,474
West Virginia	3,578,334	—	125,075	1,450,555	5,153,964
Total 1965	28,398,105	2,516,155	4,255,894	38,633,132	93,820,388
At merchant plants	569,831	—	931,073	7,016,052	9,166,787
At furnace plants	27,828,274	2,516,155	3,324,821	31,617,080	84,653,601
Total 1964	26,879,714	2,234,438	3,685,900	37,972,429	90,336,413

Table 39.—Quantity and percentage of captive coal received by oven-coke plants in the United States
(Short tons)

Year	At merchant plants			At furnace plants			Total		
	Total coal received	Captive coal		Total coal received	Captive coal		Total coal received	Captive coal	
		Quantity	Percent		Quantity	Percent		Quantity	Percent
1957–59 (average)	10,270,085	4,523,385	44.0	76,660,207	48,941,264	63.8	86,930,292	53,464,649	61.5
1962	7,337,664	3,361,357	45.8	65,412,231	41,377,978	63.3	72,749,895	44,739,335	61.5
1963	8,018,890	3,642,257	45.4	69,104,327	43,502,197	63.0	77,123,217	47,144,454	61.1
1964	9,207,668	3,172,241	34.5	81,128,745	53,265,248	65.7	90,336,413	56,437,489	62.5
1965	9,166,787	3,228,861	35.2	84,653,601	55,228,352	65.2	93,820,388	58,457,213	62.3

CAPTIVE COAL

More than 60 percent of the coal received by oven-coke plants is produced by company owned or affiliated mines. This coal, known as captive, ordinarily does not move in commercial channels, but is mined to supply company requirements.

Iron and steel producing companies own the bulk of the captive mines, and in 1965, 65 percent of the total coal received by furnace plants was captive. Some merchant coke plants also own mines but only about one-third of the coal received by merchant plants was captive.

Table 40.—Month-end stocks of bituminous coal at oven-coke plants in the United States
(Short tons)

Month	1961	1962	1963	1964	1965
January	10,483,155	9,778,578	7,338,642	7,780,399	9,517,255
February	9,788,567	9,407,933	7,232,935	7,899,711	9,224,923
March	9,551,136	9,404,688	6,595,093	8,298,576	9,424,025
April	9,331,749	9,431,344	6,883,100	8,410,773	9,575,957
May	9,851,556	9,668,244	7,647,971	8,840,881	9,749,102
June	9,932,172	10,360,167	8,202,228	9,375,431	9,970,141
July	8,495,602	8,256,863	6,386,167	7,467,186	7,743,950
August	8,936,261	8,276,856	6,918,806	7,969,248	8,501,212
September	9,135,237	8,179,859	7,290,283	8,643,158	8,252,813
October	9,813,136	8,622,170	7,911,761	9,346,389	9,107,234
November	10,452,933	8,849,458	8,054,381	9,872,705	9,742,584
December	10,392,751	8,305,379	8,014,046	10,081,035	10,505,707

Table 41.—Month-end stocks of anthracite at oven-coke plants in the United States
(Short tons)

Month	1961	1962	1963	1964	1965
January	74,624	85,037	99,088	82,485	103,820
February	62,092	72,282	73,173	67,204	82,080
March	50,036	58,826	51,011	42,176	69,019
April	51,222	51,201	44,880	36,583	59,026
May	54,241	52,181	40,473	42,782	68,435
June	57,494	52,652	55,515	58,768	86,581
July	58,947	61,979	58,471	60,035	95,502
August	59,811	71,150	71,982	67,531	96,629
September	73,292	88,897	87,493	82,882	104,889
October	98,923	101,987	110,091	103,198	113,935
November	109,281	122,315	121,476	132,546	125,057
December	98,381	115,338	113,620	129,342	133,999

STOCKS

Month-end stocks of bituminous coal and anthracite at oven-coke plants are shown in tables 40 and 41. During the year bituminous-coal stocks declined, reaching a low point in July when production was curtailed at most bituminous mines. Stocks began to increase during the latter part of the year, however, and at the end of December were about 4 percent larger than when the year began. The 10.5 million tons of bituminous coal on hand at furnace and merchant plants on December 31, 1965, was equivalent to 44 days' supply, based upon prevailing consumption rates for the month.

Only small quantities of anthracite are stocked, but the 133,999 tons on hand on December 31, 1965, was 4 percent larger than the amount on hand at the end of the previous year.

TECHNOLOGY

A significant development in the coke industry of the United States in 1965 was the beginning of construction of large coke ovens by two of the major coke-oven builders. These ovens are the result of considerable research and development work by coke-oven builders to increase productivity and reduce production costs of coke and coal chemicals. Koppers Co., Inc., had under construction at the close of 1965 a small battery of five large-capacity ovens at its Kearney, N.J., plant. These ovens, which are nearly 19 feet high, will incorporate several novel features, such as high-conductivity oven brick, oven walls that decrease in thickness from the pusher side to the coke side, and readily controllable, multilevel burning system. Scheduled for completion about midyear 1966, this battery should provide specific information on the economics of operation for this type of oven.[1]

The Wilputte Coke-Oven Division of Allied Chemical Corp. also is erecting large-capacity ovens at the Ashland, Ky., works of the Semet-Solvay Division of Allied Chemical Corp. A battery of 70 ovens, which are 16 feet 9 inches high and 48 feet

[1] Coke Units Stand Tall. Chemical Week, v. 98, No. 17, Apr. 23, 1966, pp. 87–88.

1.75 inches long and have an average width of 18 inches, is presently under construction and should be completed in 1966. These ovens, with a volume capacity of 1,102 cubic feet, will hold 27.5 tons per charge and carbonize coal in 15 hours, thereby increasing daily coal throughput from about 24 tons in the normal 13-foot-high ovens to 40 tons. Many new features, such as improved materials-handling equipment, better refractory materials, and improved heating design will be incorporated in the new ovens and auxiliary facilities. Allied claims that, with the use of preheated coal, a throughput of 60 tons per day ultimately can be achieved.[2]

Increased productivity in some coke plants in the United States is being accomplished by rapid reversals of the heating cycle. In heating coke ovens, the flow direction of fuel gas, air, and waste gas is reversed periodically. Usually, this is done every 30 minutes, because if the gas were to continue burning in the same direction indefinitely, the temperature in the combustion flues would rise to levels that would not only endanger the brickwork, but the coal would be coked unevenly in the ovens. It has been found that by shortening the reversal cycle, higher average flue temperatures can be maintained with increased productivity.[3]

The results of a series of tests conducted at the Clairton works of the U.S. Steel Corp. on the use of dense silica brick for coke-oven walls were described in the technology section of the preceding issue of this chapter. Similar tests conducted in pilot-scale ovens by the Republic Steel Corp. in 1965 confirm laboratory findings that heat flow through silica brick can be improved by increasing the density of the brick. The greatest improvement was noted with a developmental silica brick of 122-pound-per-cubic-foot density. Based upon a 1-year service trial, this high-density brick appears to be suitable for use in commercial ovens. With the use of such brick, the tests indicated that productivity can be increased as much as 20 percent.[4]

An improved method[5] for removing hydrogen sulfide from gases with the use of active carbon as a catalyst is covered in British Patent 993,514. In this process the gas first is washed in a packed tower at 0° to 20° C with an aqueous suspension of finely divided active carbon. The amount of active carbon required is much smaller than that used in previous processes and attrition of the carbon is avoided. The hydrogen sulfide-laden suspension then is passed to a second tower in which it flows countercurrent to a stream of oxygen and air which oxidizes the hydrogen sulfide to sulfur. The carbon then is separated and the sulfur dissolved out, or the carbon and sulfur are burned together to form sulfur dioxide. The process, which removes a large amount of hydrogen sulfide from a gas, has the advantage that an excess of oxygen may be used and the quantity of oxygen does not have to be matched with that of the hydrogen sulfide as in a single-stage process.

The Inland Steel Co. has developed a two-stage process[6] for manufacturing high-grade metallurgical coke from marginal coking coals, at the same time recovering tar and gas. In the first stage, crushed coal, which is predominantly smaller than 1/8-inch size, is heated to 1,200° to 1,500° F for about 7 hours in indirectly heated retorts or chambers. The low-temperature stage produces a strong agglomerate which then is transferred to the high-temperature stage where carbonization is continued at 2,000° to 2,400° F for about 1 to 1½ hours. A typical charge of 100-percent Illinois coal produced a coke of mean size 3½ inches with a 1-inch stability index of 58, plus 25 gallons of tar and 7,000 cubic feet of gas with a calorific value of 850 British thermal units per cubic foot for each ton of coal carbonized.

A German firm has patented a method for the complete removal of ammonia from liquor without liming.[7] In the process, liquor is freed from oil and suspended matter and heated to 200° C in a pipe still at a pressure of 40 atmospheres. The vapor-liquid mixture is separated in a column wherein all ammonia is released and the

[2] Oil, Paint, and Drug Reporter, v. 189, No. 3, Jan. 17, 1966, p. 4.

[3] Price, J. G., and P. Palumbo. Improved Coke-Oven Battery Heating With Rapid Heating Reversals. Blast Furnace and Steel Plant, v. 52, No. 11, Nov. 1964, pp. 1036–38.

[4] High-Density Silica Liners Increase Coking Rate. Blast Furnace and Steel Plant, v. 53, No. 11, November 1965, pp. 1027–32.

[5] Final Purification of Gas. Coke Review, v. 4, No. 2, April–June 1965, p. 35.

[6] Two Stage Coking Process. Coke Review, v. 4, No. 2, April–June 1965, pp. 23–24. (U.S. Pat. 3,075,889, 1963.)

[7] Method for the Treatment of Gas Liquor and Similar Solutions. Coke Review, v. 4, No. 1, January–March 1965, pp. 33–34. (B. D. Patent 976,733, 1964.)

residual liquor retains the acid radicals. The decomposition of fixed ammonium salts may be accelerated by the addition of 0.5 percent of an alkali salt, alkaline-earth, or heavy metals, and a small quantity of hydrogen peroxide or another substance with anions higher in the voltaic series.

The large-capacity, coke-oven-gas recovery facilities and chemical-processing facilities being constructed at the Clairton, Pa., plant of U.S. Steel Corp. described in the "Coke and Coal Chemicals" chapter of the Bureau of Mines Minerals Yearbook 1964 are expected to be completed by the end of 1966. These facilities will produce anhydrous ammonia from hydrogen extracted from coke-oven gas and yield an improved desulfurized fuel gas.

Bureau of Mines research during the year was devoted principally to fundamental studies on both high-temperature (1,800° F) and low-temperature carbonization of coals and lignite, including process development and the identification and classification of chemicals, and a variety of other investigations involving the use of coals and char for the production of coke. All studies were conducted by Bureau personnel at the Morgantown (W. Va.) and Pittsburgh (Pa.) Coal Research Centers, and at the Grand Forks (N. Dak.) Lignite Research Laboratory.

High-temperature carbonization research was directed toward the development of methods and processes that could help to retain or expand coking-coal markets by creating better and cheaper fuels for metallurgical use. Specific projects supporting this objective involved strength tests of hot coke, the addition of char and other materials to coking-coal blends, the production and use of anthracite briquets for blast-furnace fuel, and the production of chemical coke from bituminous and subbituminous coals in traveling-grate stokers; and surveys to evaluate the coking potential of U.S. coals.

In tests of blast-furnace coke, it was found that the strength of hot coke, an important factor in blast-furnace performance, was essentially equal to the strength of the same coke tested at room temperature by ASTM tumbler-test methods. Tests were conducted at temperatures to 1,100° C on eight samples of coke that had tumbler stability indexes ranging from 40.6 to 59.9.

Investigations were conducted to determine the effect that char, used as a substitute for the low- and medium-volatile coals commonly used for blending with Western coals, had upon the physical properties of the coke produced from such blends. In a number of tests in which cokes produced from blends containing chars of varying volatile content were compared with blast-furnace coke produced from an industrial coking-coal blend, it was found that the coal-char blends produced hard coke of good size. The ASTM stability index of such coke, however, was considerably lower than that of the industrial-blend coke.

Anthracite briquet research was aimed at producing a suitable blast-furnace fuel. It has been determined that continuous calcining is essential to the economic production of a metallurgical fuel from anthracite and, on the basis of pilot-plant tests, a gas-fired sintering system for calcining was assembled. Investigations on this project are being continued.

Bituminous and subbituminous coals were carbonized in a traveling-grate stoker in an effort to make chemical coke, which is used in the manufacture of calcium carbide, phosphorus, and other products. Cokes having satisfactory physical properties were produced from all of the bituminous coals, but the subbituminous coals yielded an extremely friable, weak char.

Carbonizing-property surveys are conducted by the Bureau of Mines to provide information on the suitability of U.S. coals for making metallurgical coke. In a continuing survey, the Bureau examined 15 samples from the Winifrede, Chilton, Alma, No. 2 Gas, Powellton, Eagle, Douglas, Sewell, Beckley, Pocahontas No. 3, and Pocahontas No. 4 beds in Wyoming County, W. Va., and 5 samples from Firecreek, Pocahontas No. 3, and Pocahontas No. 6 beds in Mercer County, W. Va. Most of these coals were strongly coking and low in ash and sulfur. A report [8] detailing the results of these investigations was published. Tests were conducted also on two little-known coal deposits in Alaska.

Low-temperature carbonization research was centered principally on the production of gaseous fuels, chemicals, and char by the

[8] Birge, G. W., D. E. Wolfson, J. E. Wilson, and J. H. Lynch, Jr. Carbonizing Properties of Coals From Wyoming and Mercer Counties, W. Va. BuMines Rept. of Inv. 6615, 1965, 21 pp.

carbonization of coal at approximately 1,200° F; the identification and characterization of products obtained from the distillation of low-temperature tars; and the separation and upgrading of tar derivatives with the end view of converting these materials economically into salable products.

Fundamental studies were made on the effect of different variables when powdered bituminous coal entrained in recycle gas was carbonized at low temperatures. The objective of this investigation was to determine the conditions giving maximum yields and particular properties to the char, tar, light oil, and combustible gas. Through a series of tests it was found that yields and the quality of all products were affected by several factors, but the most important was temperature. An increase in the temperature of the gas from 740° to 1,500° F more than doubled the gas yield but substantially reduced its calorific value; this also reduced the char yield. Although tar and light oil yields remained essentially the same at this temperature, the addition of 12 standard cubic feet per hour of 1,000° F steam increased the yield of both products.

In other process development studies, carbonizing methods and conditions were compared relative to their effect on yields and the nature of resulting products. With respect to tar, the yield of every class of chemical in the tar appears to have been affected by one or more of the following four variables: (1) carbonizing equipment or processes, (2) nature of carrier gas or atmosphere, (3) carbonization temperature, and (4) coal used.

Investigations directed toward the conversion of low-temperature tars into marketable products were continued at the Morgantown Coal Research Center. In an analysis of neutral oil derived from tar recovered from a West Virginia bituminous coal, it was established that 51 compounds were present. Of this number 19 were specifically identified and the quantities of classes of compounds as well as individual compounds were determined. Straight-chain paraffins and olefins from pitch of the same tar also were analyzed, and other parts of the pitch were dehydrogenated for structure determination.

Other laboratory studies were concerned with product separation and upgrading and in one area the thermal cracking of pitch at 1,400° F produced a liquid product from which a distillate was obtained that, upon oxidation, yielded 17 percent phthalic anhydride and 13 percent maleic anhydride. Both products are in demand for use in the production of placticizers and resins. The refined distillation pitch proved to be an excellent binder for carbon electrodes, and tar acids and bases in the distillate were found to contain from 4 to 5 percent commercially valuable phenols, cresols, and zylenols.

The preparation of biodegradable or "soft" detergents from low-temperature lignite tar was the subject of continued study and it was found that linear alkylbenzene sulfonate prepared from the constituents of such tar was 99.5 percent biodegradable. Such detergents are in demand because they are readily broken down by bacteria in rivers and streams, hence they will not aggravate the Nation's stream pollution and water supply problems. Primary alcohol production from low-temperature tar olefins also received further study.

A detailed summary of Bureau of Mines research on coal, including coal carbonization, in 1965 will be published as part of a continuing series entitled "Bureau of Mines Research and Technologic Work on Coal."

COAL CHEMICALS

GENERAL REVIEW

The term "coal chemicals" refers to the chemical materials recovered from the volatile matter released from coal during carbonization. Normally, three basic materials —ammonia, tar, and light oil—are recovered at oven-coke plants through a series of complex condensation and absorbtion processes. The remaining material, which is rich in hydrogen and methane, is called coke-oven gas. Except for ammonia, which is recovered as an aqueous solution or converted to a salt and sold as produced, the basic materials are in most instances further processed to yield a number of primary organic chemicals or chemical mixtures of which the most important are benzene, toluene, xylene, solvent naphtha, crude chemical oil, creosote oil, pitch, and pyridine. Although most oven-coke plants in the United States are equipped to process tar and light oil, the extent to which individual plants produce the various products depend upon economic conditions and a number of other factors.

Yields of the basic, as well as the primary, chemicals vary somewhat with the kind of coals carbonized, carbonizing temperatures, and operating techniques and equipment, but approximately 315 pounds of coke-oven gas, 90 pounds of tar, 20 pounds of light oil, and 5 pounds of ammonia are recovered for each ton of coal carbonized. In standard units of measure these quantities amount to about 10,500 cubic feet of coke-oven gas, 10 gallons of tar, and 3 gallons of light oil. Ammonia is recovered as ammonium sulfate at most operations, and the yield per ton of coal is approximately 20 pounds. Data on production and sales of basic chemical materials and derivatives at oven-coke plants in 1965 are shown in table 42.

The relative yields of basic coal chemicals recovered since 1930 are shown in figure 6. Although yields have varied only slightly from year to year, the figure illustrates that more gas and chemicals were recovered in periods of low industrial activity when there was less demand for coke. This situation prevailed during the 1930's, when operating rates of ovens were low and coking cycles were longer than normal to provide for the maximum recovery of gas and chemicals which were in demand and readily marketable at that time. Yields fell substantially during World War II, when producers operated ovens for maximum coke recovery, and after the war changes in supply and demand patterns of coke, gas, and chemicals kept yields below the levels attained in the 1930's. In recent years, yields have varied somewhat because of changes in coal mixes and operating practices, and gas and tar yields have tended to increase in the past decade, while the ammonia yield has declined. Light oil yields, however, have remained at virtually the same level since the 1920's.

Figure 7, which depicts the relative value of all products recovered from slot ovens, shows that the proportion of the total value supplied by surplus gas and chemical materials has declined steadily since 1930. Most of the decline in surplus coke-oven gas revenues has been caused by the introduction of natural gas into residential and industrial heating markets. The reduction in the value of chemicals was largely the result of competition from petrochemicals which in recent years has become increasingly keen because of the development of new methods for producing high-purity, lower cost products from natural gas and petroleum.

Table 43 shows the heating value and coal equivalent of products other than coke produced at oven-coke plants. Although the quantities vary from year to year, most of the changes were due to differences in the amount of coal carbonized, rather than fluctuations in yields. In terms of heating value, the products, not including coke, recovered in 1965 were roughly equivalent to the heating value of about one-fourth of the coal carbonized in slot ovens. Table 44 shows average values for the chemicals and surplus gas used and sold, compared with the unit values of the coke and breeze produced, from each ton of coal carbonized. Compared with 1957–59, both chemicals and gas have declined in unit value. The largest decreases, however, have been registered by chemicals which have declined 20 percent in overall unit value since 1957–59. Most of the decrease in the value of chemicals during this period has been caused by sharp reductions in the prices of light-oil derivatives, particularly specification-grade benzene, which represents about three-fourths of the total dollar value of all light-oil products sold, and which has declined in value about $0.10 per gallon since 1957. Surplus gas, which accounted for 46 percent of the total dollar value of all coal-chemical materials used or sold, declined 2 percent in unit value from 1957–59, and tar and ammonia products used or sold declined 18 percent and 13 percent, respectively.

COKE-OVEN GAS

Coke-oven gas is the term applied to the gas that remains after tar, ammonia, and light oil have been removed from the volatile matter evolved in carbonization. With a relatively high calorific value because it is composed principally of hydrogen and methane, most of the coke-oven gas is used as fuel by producers, principally for heating coke ovens and other steel- and allied-plant furnaces. However, a few plants sell

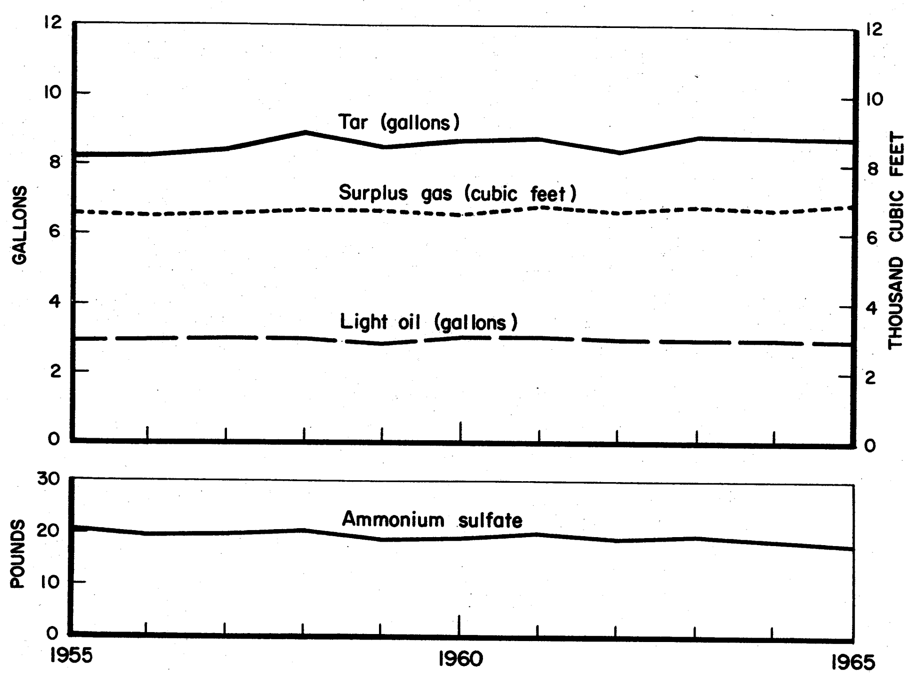

Figure 6.—Average yield of principal coal-chemical materials per short ton of coal carbonized in slot ovens in the United States. Yields of light oil and ammonium sulfate equivalent represent average for plants recovering these products.

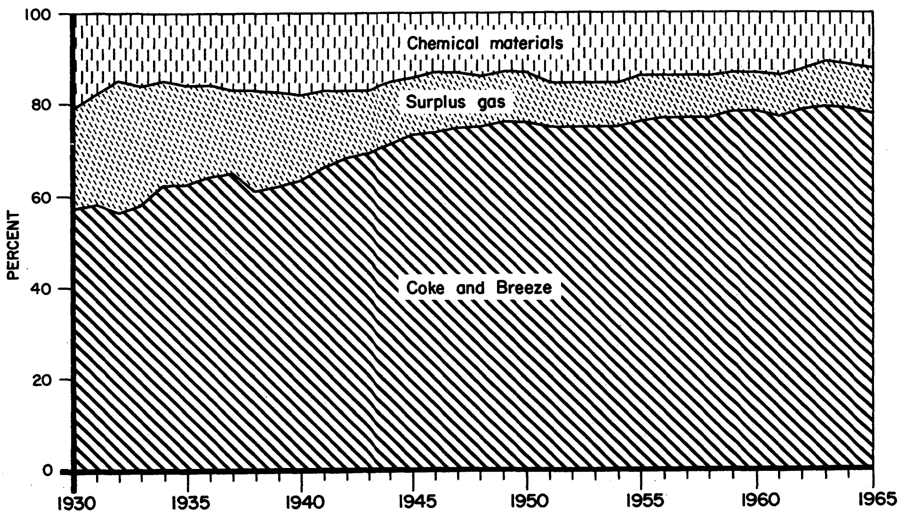

Figure 7.—Percentage of total value of coke-oven products from slot ovens supplied by coke and breeze, surplus gas, and chemical materials in the United States.

Table 42.—Coal-chemical materials, exclusive of breeze, produced at oven-coke plants in the United States in 1965 [1]

Product	Produced	Sold			On hand Dec. 31
		Quantity	Value		
			Total	Average	
Tar, crude ....gallons...	802,737,740	[2] 366,228,725	$36,665,763	$0.100	40,316,236
Tar derivatives:					
Sodium phenolate or carbolate ....do.....	3,236,907	3,145,624	358,846	.114	210,539
Crude chemical oil (tar acid oil) ....do.....	28,027,443	28,634,823	4,364,891	.152	972,538
Pitch-of-tar: [3]					
Soft ....short tons..	756,133	172,345	4,270,726	24.780	29,112
Hard ....do.....	409,628	109,903	3,831,800	34.865	59,007
Other tar derivatives [4]	—	—	12,707,139	—	—
Ammonia products:					
Sulfate ....short tons..	693,292	663,246	18,971,946	28.605	183,899
Liquor (NH_3 content) ....do.....	15,966	14,061	910,242	64.735	1,681
Diammonium phosphate ...do.....	48,534	49,687	4,970,779	100.042	4,809
Total	—	—	24,852,967	—	—
Sulfate equivalent of all forms ....short tons..	803,758	767,475	—	—	195,228
NH_3 equivalent of all forms .do.....	207,209	197,855	—	—	50,330
Gas:					
Used under boilers, etc. thousand cubic feet	[5] 978,007,364	103,501,216	19,489,101	.188	—
Used in steel or allied plants ....do...		476,748,049	110,604,344	.232	—
Distributed through city mains ....do...		22,391,487	9,403,285	.420	—
Sold for industrial use ....do...		27,170,864	4,567,180	.168	—
Total ....do.....	978,007,364	629,811,616	144,063,910	.229	—
Crude light oil ....gallons...	[6] 262,700,991	69,537,365	9,441,078	.136	7,715,104
Light oil derivatives:					
Benzene:					
Specification grades (1°, 2°, 90 percent)..do.....	117,990,471	123,415,957	28,902,958	.234	4,468,310
Other industrial grades.do.....	3,926,683	4,033,208	748,731	.186	60,328
Toluene (all grades) ....do.....	24,815,762	25,086,510	4,622,029	.184	1,698,117
Xylene (all grades) ....do.....	6,740,974	6,912,976	1,523,015	.220	868,675
Solvent naphtha (all grades) ....do.....	5,420,421	4,578,116	868,621	.190	868,416
Other light oil derivatives ....do.....	7,994,588	4,888,135	448,153	.092	368,207
Total ....do.....	166,888,899	168,914,902	37,113,507	.220	8,332,053
Intermediate light oil ....do.....	4,939,190	1,815,431	182,895	.101	311,978
Grand total	—	—	277,853,522	—	—

[1] Includes products of tar distillation conducted by coke-oven operators under same corporate name.
[2] Includes 28,108,081 gallons sold to affiliated companies for refining and a small amount exported.
[3] Soft—water-softening point less than 110° F; medium—from 110° to 160° F; hard—over 160° F. Figures on hard pitch include small amount of medium pitch.
[4] Creosote oil, cresols, cresylic acid, naphthalene, phenol, pyridine, refined tar, tar paint.
[5] Includes gas used for heating ovens and gas wasted.
[6] 193,583,791 gallons refined by coke-oven operators to make derived products shown.

all or part of their output for distribution through city mains and other industrial uses.

Yields of gas vary, but the quantity of gas produced for each ton of coal carbonized at high temperatures in slot ovens generally ranges between 9,300 and 11,000 cubic feet, equivalent to from 14 to 16 percent of the weight of the coals carbonized. The overall yield of 10,560 cubic feet in 1965 was slightly more than the yield of 10,370 cubic feet recorded for 1964. This partially accounted for an 8-percent increase in total gas production, but most of the increase was due to the additional 5 million tons of coal carbonized in 1965.

Table 43.—Coal equivalent of the thermal materials, except coke, produced at oven-coke plants in the United States

Year	Materials produced				Estimated equivalent in heating value [1] (billion Btu)					Coal equivalent (thousand short tons)
	Coke breeze (thousand short tons)	Surplus gas (billion cubic feet)	Tar (thousand gallons)	Light oil (thousand gallons)	Coke breeze	Surplus gas	Tar	Light oil	Total	
1913	735	64	115,145	3,000	14,700	35,200	17,272	390	67,562	2,600
1918	1,999	158	263,299	87,562	39,980	86,900	39,495	11,383	177,758	6,785
1929	4,853	508	680,864	200,594	97,060	279,400	102,130	26,077	504,667	19,262
1939	3,354	434	554,406	170,963	67,080	238,700	83,161	22,225	411,166	15,693
1949	4,929	546	672,407	228,754	98,580	300,300	100,861	29,738	529,479	20,209
1957–59 (average)	4,077	568	732,173	244,118	81,532	312,400	109,826	31,735	535,493	20,439
1962	3,425	484	650,112	211,688	68,500	266,200	97,517	27,519	459,736	17,547
1963	3,609	516	671,876	218,166	72,180	283,800	100,781	28,362	485,123	18,516
1964	3,902	582	762,918	248,669	78,040	320,100	114,438	32,327	544,905	20,798
1965	4,037	630	802,738	262,701	80,740	346,500	120,411	34,151	581,802	22,206

[1] Breeze, 10,000 Btu per pound; gas, 550 Btu per cubic foot; tar, 150,000 Btu per gallon; and light oil, 130,000 Btu per gallon.

Table 44.—Average value of coal-chemical materials used or sold and of coke and breeze produced per short ton of coal carbonized in the United States

Product	1957–59 (average)	1962	1963	1964	1965
Ammonia products	$0.307	$0.286	$0.270	$0.275	$0.268
Light oil and its derivatives	.687	.545	.473	.459	.505
Surplus gas used or sold	1.592	1.527	1.526	1.516	1.556
Tar and its derivatives (including naphthalene):					
Tar burned by producers [1]	.427	.404	.336	.381	.362
Sold	.828	.848	.719	.705	.672
Total	3.841	3.610	3,324	3.336	3.363
Coke produced	12.749	12.640	12.253	12.426	11.890
Breeze produced	.308	.324	.328	.303	.301
Grand total	16.898	16.574	15.905	16.065	15.554

[1] Includes pitch-of-tar.

Table 45.—Percentage of coal costs recovered from the recovery of coal-chemical materials in the United States

	1957–59 (average)	1962	1963	1964	1965
Product:					
Ammonia products	3.1	2.9	2.8	3.0	2.8
Light oil and its derivatives	6.9	5.5	5.0	4.9	5.3
Surplus gas used or sold	16.1	15.5	16.1	16.3	16.4
Tar and its derivatives used or sold (including naphthalene)	12.7	12.7	11.1	11.7	11.0
Total	38.8	36.6	35.0	35.9	35.5
Value of coal per short ton	$9.90	$9.85	$9.49	$9.28	$9.51

Tables 46 and 47 show coke-oven gas production and the quantities of gas sold and used for various purposes. Roughly, one-third of the production was used at the plants for heating coke ovens. The remainder, called surplus gas, was used by producers for firing boilers, transferred to steel or allied plants for heating open hearth and other metallurgical furnaces, and sold for industrial use or distribution through city mains. A small part of the production was wasted because storage facilities at most plants are limited and the gas was burned in the atmosphere when production exceeded demand.

Table 47 also shows the disposal of surplus gas by the two segments of the industry. Whereas 97 percent of the surplus gas produced by furnace plants was consumed by producing companies, particularly in steel and allied plants, merchant plants used only about 30 percent of their surplus. Merchant-plant sales were about equally divided between city mains and industrial plants, while furnace-plant sales were principally to industrial plants.

The disposal pattern of surplus gas in 1965 was about the same as that which has prevailed at both furnace and merchant plants for the past few years, but there has been a significant change during the past few decades in the percentages of surplus gas used by producers and the percentages sold, particularly by furnace plants. Whereas furnace plants during the 1930's and 1940's sold a relatively large percentage of their surplus gas to utilities and industrial plants, these plants now distribute the bulk of the gas not consumed within the plant, to affiliated plants, because the utility and industrial gas markets have virtually been lost to natural gas. Merchant plants continue to market the major part of their production; but the decline in the use of coke-oven gas for residential and industrial heating has caused many plants to discontinue operations.

Most slot ovens were heated with coke-oven gas, but some operators used blast-furnace gas, a mixture of coke-oven and blast-furnace gases, or natural gas, for underfiring. Of the 401 billion cubic feet of gas (coke-oven gas equivalent) consumed, 84 percent was coke-oven gas; 15 was blast-furnace gas; and the remainder was natural gas and producer gas. The quantities of the various gases consumed in each State, along with total gas consumption in terms of coke-oven gas equivalent, are shown in table 48.

The total value of surplus coke-oven gas used and sold in 1965 was $144 million, a 9-percent increase over the total value in 1964. Producers do not report a value for the coke-oven gas used for heating coke ovens, but if the average value of $0.229 per thousand cubic feet reported for surplus gas were applied to the gas used for underfiring, the total value of all coke-oven gas used and sold in 1965 would be $222 million. This value is equivalent to about one-fourth of the total value of the coal carbonized.

COKE-OVEN AMMONIA

The nitrogen released from coal during high-temperature carbonization is recovered through subsequent processing as ammonia liquor or as a crystallized solid. Ammonia liquor is a weak solution of ammonia (approximately 7 grams per liter of solution), while the solid forms are ammonium sulfate, and diammonium and monoammonium phosphates.

The removal of ammonia is a necessary part of coal-chemical processing because ammonia salts, which subsequently are formed, corrode equipment, and contaminate other products. Most of the ammonia

Table 46. Production and disposal of coke-oven gas in the United States, in 1965, by State

(Thousand cubic feet)

State	Produced: Total	Produced: Per ton of coal coked	Used in heating ovens	Surplus used or sold: Quantity	Surplus: Value: Total	Surplus: Value: Average	Wasted
Alabama	71,316,358	9.83	33,369,524	36,794,797	$4,850,220	$0.132	1,152,037
California, Colorado, Utah	56,517,296	11.16	18,165,744	37,983,986	7,763,418	.204	367,566
Connecticut, Maryland, New Jersey, New York	131,058,401	11.02	37,059,619	92,418,697	33,461,329	.362	1,580,085
Illinois	37,523,523	10.40	11,235,361	25,766,258	4,385,052	.170	521,904
Indiana	133,427,231	11.12	39,143,795	93,413,305	17,913,518	.192	870,131
Kentucky, Missouri, Tennessee, Texas	27,222,976	9.33	13,936,065	12,615,784	1,689,227	.134	671,127
Michigan	52,777,831	9.77	9,251,752	43,452,653	10,301,025	.237	73,426
Minnesota and Wisconsin	14,023,519	9.68	7,456,250	6,310,944	1,292,429	.205	256,325
Ohio	105,923,047	9.73	39,541,540	65,234,137	15,887,763	.244	1,147,370
Pennsylvania	290,651,663	10.77	113,492,690	174,588,532	36,601,120	.210	2,570,441
West Virginia	57,565,519	11.20	15,577,980	41,232,523	9,918,809	.241	755,016
Total 1965	978,007,364	10.56	338,230,320	629,811,616	144,063,910	.229	9,965,428
At merchant plants	81,728,041	8.95	37,673,926	42,977,842	12,078,643	.281	1,076,273
At furnace plants	896,279,323	10.74	300,556,394	586,833,774	131,985,267	.225	8,889,155
Total 1964	904,697,479	10.37	314,197,930	582,147,312	132,267,464	.227	8,352,237

Table 47.—Surplus coke-oven gas used by producers in the United States and sold in 1965, by State

(Thousand cubic feet)

State	Used by producers					
	Under boilers, etc.			In steel or allied plants		
	Quantity	Value		Quantity	Value	
		Total	Average		Total	Average
Alabama	13,844,371	$1,882,376	$0.136	19,597,372	$2,553,830	$0.130
California, Colorado, Utah	(1)	(1)	(1)	(1)	(1)	(1)
Connecticut, Maryland, New Jersey, New York	2,930,452	711,485	.243	72,678,862	24,812,511	.341
Illinois	4,109,556	577,965	.141	15,035,102	2,792,922	.186
Indiana	11,131,229	2,097,691	.188	78,969,179	14,432,761	.183
Kentucky, Missouri, Tennessee, Texas	5,190,107	581,398	.112	(1)	(1)	(1)
Michigan	(1)	(1)	(1)	36,792,323	8,611,686	.234
Minnesota and Wisconsin	(1)	(1)	(1)	(1)	(1)	(1)
Ohio	7,832,100	1,767,783	.226	50,880,829	12,904,386	.254
Pennsylvania	29,591,389	5,640,050	.191	141,538,342	30,452,855	.215
West Virginia	(1)	(1)	(1)	(1)	(1)	(1)
Undistributed	28,872,012	6,230,353	.216	61,256,040	14,043,393	.229
Total 1965	103,501,216	19,489,101	.188	476,748,049	110,604,344	.232
At merchant plants	10,512,638	1,902,095	.181	2,607,941	549,453	.211
At furnace plants	92,988,578	17,587,006	.189	474,140,108	110,054,891	.232
Total 1964	74,488,904	13,445,251	.181	460,270,046	105,179,613	.229
	Sold					
	Distributed through city mains			For industrial use		
	Quantity	Value		Quantity	Value	
		Total	Average		Total	Average
Alabama	(1)	(1)	(1)	2,269,957	$339,698	$0.150
California, Colorado, Utah	—	—	—	(1)	(1)	(1)
Connecticut, Maryland, New Jersey, New York	16,729,758	$7,917,778	$0.473	(1)	(1)	(1)
Illinois	—	—	—	(1)	(1)	(1)
Indiana	(1)	(1)	(1)	(1)	(1)	(1)
Kentucky, Missouri, Tennessee, Texas	—	—	—	(1)	(1)	(1)
Michigan	—	—	—	(1)	(1)	(1)
Minnesota and Wisconsin	—	—	—	(1)	(1)	(1)
Ohio	—	—	—	6,521,208	1,215,594	.186
Pennsylvania	(1)	(1)	(1)	(1)	(1)	(1)
West Virginia	—	—	—	(1)	(1)	(1)
Undistributed	5,661,729	1,485,507	.262	18,379,699	3,011,888	.164
Total 1965	22,391,487	9,403,285	.420	27,170,864	4,567,180	.168
At merchant plants	15,814,360	7,025,683	.444	14,042,903	2,601,412	.185
At furnace plants	6,577,127	2,377,602	.361	13,127,961	1,965,768	.150
Total 1964	21,892,599	9,287,932	.424	25,495,763	4,354,668	.171

[1] Included with "Undistributed" to avoid disclosing individual company data.

is recovered in collecting mains where the gas is cooled as it leaves the ovens and, later, when it is channeled through cooling towers. A small amount which remains in the gas stream is removed, either by scrubbing, or by passing the gas through a saturator where ammonia is reacted with sulfuric acid to form ammonium sulfate.

The bulk of the ammonia recovered at coke plants is used for ammonium sulfate production, and 49 plants used 92 percent of the total ammonia recovered in 1965 to produce 742,000 tons of ammonium sulfate. Included in this figure was 49,000 tons of diammonium phosphate which was produced at three plants by a somewhat different process. Some plants find it uneconomical to produce ammonium sulfate, and 10 plants recovered ammonia in concentrated solution in 1965. Seven plants, however, produced neither ammonia liquor nor other ammonia products.

Table 48.—Coke-oven gas and other gases used in heating coke ovens in the United States in 1965, by State [1]

(Thousand cubic feet)

State	Coke-oven gas	Blast furnace gas	Natural gas	Total coke-oven gas equivalent
Alabama	33,369,524	—	8,416	33,377,940
California, Colorado, Utah	18,165,744	3,859,090	23,018	22,047,852
Connecticut, Maryland, New Jersey, New York	37,059,619	[2] 12,798,279	1,118,701	50,976,599
Illinois	11,235,361	5,616,594	—	16,851,955
Indiana	39,143,795	11,250,927	421,182	50,815,904
Kentucky, Missouri, Tennessee, Texas	13,936,065	—	—	13,936,065
Michigan	9,251,752	14,928,801	—	24,180,553
Minnesota and Wisconsin	7,456,250	—	—	7,456,250
Ohio	39,541,540	3,685,456	—	43,226,996
Pennsylvania	113,492,690	1,910,282	—	115,402,972
West Virginia	15,577,980	6,773,543	—	22,351,523
Total 1965	338,230,320	60,822,972	1,571,317	400,624,609
At merchant plants	37,673,926	1,183,911	3,466	38,861,303
At furnace plants	300,556,394	59,639,061	1,567,851	361,763,306
Total 1964	314,197,930	[2] 60,879,237	2,086,965	377,164,132

[1] Adjusted to an equivalent of 550 Btu per cubic foot.
[2] Includes small amount of producer gas.

Table 49 shows production and sales of ammonia products and yields in 1965 in terms of sulfate equivalent. Compared with 1964, the yield decreased in 14 of the 18 ammonia-producing States, probably because the high operating rates of ovens required higher temperatures and shorter coking cycles that reduced the amount of ammonia formed. The yield was affected also by the discontinuance of ammonia recovery by several plants in the latter part of the year. Although the overall ammonia yield decreased 4 percent, total ammonia production increased about 1 percent because of the larger quantity of coal carbonized.

Sales of ammonium sulfate increased 4 percent, but coke-oven operators sold only 96 percent of their output, and stocks increased 14 percent to 189,000 tons. Virtually all ammonia liquor produced was either used by producers or sold, and stocks of liquor remained at about the same level as they were when the year began. Of significance in ammonium sulfate markets in 1965 was a 52-percent increase in foreign shipments. Exports for the year totaled 70,000 tons, approximately 10 percent of the total quantity sold.

The average value per ton, f.o.b. plant, of ammonium sulfate increased $0.34 per ton to $28.61, while the average plant value of diammonium phosphate increased $1.29 per ton to $100.04. The average value per ton of ammonia liquor decreased 8 percent, but the value of total ammonia products sold was not appreciably affected because sales of ammonia liquor were relatively small. The total value of all ammonia products sold was $25 million, equivalent to 8 percent of the total value of all coal-chemical materials used or sold.

Although the sale of ammonia products returned coke-oven operators nearly $25 million in 1965, coke-oven ammonia represented only about 3 percent of the estimated 9.4 million tons of ammonia output from all sources. More than 90 percent of the output was synthetic anhydrous ammonia, produced from natural gas. The remainder, except for the sulfate and liquor produced at coke plants, was synthetic ammonium sulfate, produced as a byproduct of the chemical industry.

Table 49.—Coke-oven ammonia produced in the United States and sold in 1965, by State

(Short tons)

State	Active plants [1]	Produced: Sulfate equivalent	Produced: Pounds per ton of coal coked	Produced: As sulfate [2]	Produced: As liquor (NH_3 content)
Alabama	7	64,772	17.85	62,802	(3)
California, Colorado, Utah	3	53,830	21.26	53,830	—
Connecticut, Maryland, New Jersey, New York	5	110,167	19.21	101,001	(3)
Illinois	4	35,022	20.01	35,022	—
Indiana	5	91,708	15.29	78,942	(3)
Kentucky, Tennessee, Texas	3	18,705	16.77	(3)	(3)
Michigan	4	37,852	14.01	(3)	(3)
Minnesota and Wisconsin	2	8,310	13.65	(3)	(3)
Ohio	10	90,269	17.31	76,331	(3)
Pennsylvania	12	245,865	18.23	245,865	—
West Virginia	3	47,258	18.39	47,258	—
Undistributed	—	—	—	40,775	15,966
Total 1965	58	803,758	17.73	[5] 741,826	15,966
At merchant plants	13	73,521	18.13	24,843	10,585
At furnace plants	45	730,237	17.69	716,983	5,381
Total 1964	59	793,908	18.49	731,062	16,202

State	Sold [6]: As sulfate: Quantity	Sold [6]: As sulfate: Value	Sold [6]: As liquor (NH_3 content): Quantity	Sold [6]: As liquor (NH_3 content): Value	On hand Dec. 31: Sulfate [2]	On hand Dec. 31: Liquor (NH_3 content)
Alabama	57,851	$1,836,954	(3)	(3)	22,041	12
California, Colorado, Utah	48,178	3,791,158	—	—	15,842	—
Connecticut, Maryland, New Jersey, New York	102,837	2,965,519	(3)	(3)	12,418	49
Illinois	35,351	1,101,371	—	—	7,140	—
Indiana	69,603	2,104,074	(3)	(3)	27,861	360
Kentucky, Tennessee, Texas	(3)	(3)	(3)	(3)	332	385
Michigan	(3)	(3)	(3)	(3)	3,240	39
Minnesota and Wisconsin	(3)	(3)	(3)	(3)	825	101
Ohio	77,599	2,092,373	(3)	(3)	10,939	735
Pennsylvania	229,058	6,295,258	—	—	82,512	—
West Virginia	46,801	1,195,707	—	—	5,558	—
Undistributed	45,655	2,560,311	14,061	$910,242	—	—
Total 1965	[7] 712,933	23,942,725	14,061	910,242	188,708	1,681
At merchant plants	22,772	684,016	10,453	719,108	7,159	1,348
At furnace plants	690,161	23,258,709	3,608	191,134	181,549	333
Total 1964	685,924	22,933,659	14,923	1,048,499	165,033	1,854

[1] Number of plants that recovered ammonia.
[2] Includes diammonium phosphate.
[3] Included with "Undistributed" to avoid disclosing individual company data.
[4] Figures include diammonium phosphate.
[5] Comprises 693,292 tons of ammonium sulfate and 48,534 tons of diammonium phosphate produced in California, Colorado, and Michigan.
[6] Includes 70,277 tons of ammonium sulfate valued at $1,905,747 exported.
[7] Comprises 663,246 tons of ammonium sulfate valued at $18,971,946 and 49,687 tons of diammonium phosphate valued at $4,970,779.

COAL TAR AND DERIVATIVES

Crude coal tar is a black, viscous mixture of complex organic compounds that condense from the volatile matter when it is cooled. Most of the tar is recovered in collecting mains at the ovens when the gas is cooled by spraying with ammonia liquor; the remainder is recovered principally from the primary coolers when the gas undergoes further cooling.

From 4 to 5 percent of the weight of the coal carbonized is recovered as tar. Although yields at individual plants ranged from about 4 to 11 gallons in 1965, the overall yield was 8.67 gallons. The highest yields were recorded in California, Colorado, Maryland, Ohio, Pennsylvania, and West Virginia because plants in these States used larger percentages of high-volatile coals. Yields were lowest at plants whose output was predominantly foundry coke because these plants used higher percentages of low- and medium-volatile coal and anthracite.

Table 50 shows the quantities of tar produced, used by producers, sold, and in inventory in the various States at the end of 1965. Although the average yield decreased slightly from that of 1964, production increased 5 percent because more coal was carbonized. Most of the production was used by producers or sold; yearend stocks were only slightly higher than at the beginning of the year.

Of the 803 million gallons of tar produced in 1965, 54 percent was used by producers. Most of this tar was partially refined or "topped", but 28 percent was burned for fuel with no processing. Producers used minor quantities for a number of miscellaneous purposes such as tarring ingots, road materials, and tar paints. The remaining 46 percent of the production was sold, principally to tar-distilling plants which refined it to produce many tar derivatives.

The topping process, which was used by 11 plants, is a method used for separating the low-boiling distillate fraction, consisting principally of tar acids, bases, and naphthalenes, from crude tar. The residue, known as soft pitch, usually is burned as fuel. Furnace plants find this process attractive because they can sell the distillate and retain the pitch for use as fuel in open-hearth furnaces. Although this reduces the amount of other fuels that normally have to be purchased, the relative

Table 50.—Coke-oven tar produced in the United States, used by producers, and sold in 1965, by State

(Gallons)

State	Produced: Total	Produced: Per ton of coal coked	Used by producers: For refining or topping	Used by producers: As fuel	Used by producers: Otherwise
Alabama	49,932,277	6.88	(1)	(1)	(1)
California, Colorado, Utah	52,392,519	10.35	(1)	(1)	(1)
Connecticut, Maryland, New Jersey, New York	105,606,836	8.88	(1)	(1)	—
Illinois	25,119,235	6.96	—	(1)	—
Indiana	100,403,122	8.36	(1)	(1)	—
Kentucky, Missouri, Tennessee, Texas	18,794,506	6.44	—	—	(1)
Michigan	39,319,298	7.28	—	(1)	—
Minnesota and Wisconsin	8,589,337	5.93	—	—	(1)
Ohio	97,174,666	8.92	(1)	37,870,847	(1)
Pennsylvania	255,214,217	9.46	142,700,961	32,521,784	773,963
West Virginia	50,191,727	9.77	(1)	(1)	—
Undistributed	—	—	169,377,671	52,567,936	96,728
Total 1965	802,737,740	8.67	312,078,632	122,960,567	870,691
At merchant plants	55,713,608	6.10	—	—	—
At furnace plants	747,024,132	8.95	312,078,632	122,960,567	870,691
Total 1964	762,917,505	8.75	293,956,698	127,871,811	370,946

State	Sold for refining into tar products[2]: Quantity	Value: Total	Value: Average	On hand Dec. 31
Alabama	29,476,508	$3,341,570	$0.113	3,685,311
California, Colorado, Utah	22,586,767	2,694,834	.119	2,714,775
Connecticut, Maryland, New Jersey, New York	27,157,075	2,621,672	.097	4,878,221
Illinois	23,555,951	2,206,467	.094	1,203,993
Indiana	47,959,119	4,454,641	.093	4,521,300
Kentucky, Missouri, Tennessee, Texas	18,677,641	1,942,519	.104	379,277
Michigan	30,796,370	2,949,594	.096	2,384,898
Minnesota and Wisconsin	8,660,035	857,178	.099	688,893
Ohio	59,121,692	5,738,622	.097	6,041,551
Pennsylvania	79,896,592	8,254,973	.103	12,135,870
West Virginia	18,340,975	1,603,693	.087	1,682,147
Undistributed	—	—	—	—
Total 1965	366,228,725	36,665,763	.100	40,316,236
At merchant plants	55,897,635	5,525,685	.099	1,524,520
At furnace plants	310,331,090	31,140,078	.100	38,791,716
Total 1964	336,084,256	34,482,791	.103	39,623,992

[1] Included with "Undistributed" to avoid disclosing individual company data.
[2] Comprises 28,108,081 gallons valued at $2,731,472 sold to affiliated companies and 338,120,644 gallons valued at $33,934,291 sold to other purchasers. Also includes small amount exported.

Table 51.—Coke-oven crude light oil produced in the United States and derived products produced and sold in 1965, by State

(Gallons)

State	Active plants [1]	Crude light oil: Produced	Crude light oil: Per ton of coal coked	Crude light oil: Refined on premises [2]	Crude light oil: On hand Dec. 31	Derived products: Produced	Derived products: Sold [3] Quantity	Derived products: Sold [3] Value
Alabama	7	16,686,665	2.30	16,112,667	711,833	13,441,211	13,687,007	$2,972,450
California, Colorado, Utah	3	17,487,007	3.45	11,415,780	234,112	10,103,405	10,160,187	(4)
Connecticut, Maryland, New Jersey, New York	6	38,690,472	3.25	31,721,528	563,174	27,109,033	27,641,892	6,211,456
Illinois and Michigan	8	23,201,266	2.61	10,956,028	484,134	9,476,357	9,636,493	2,211,855
Indiana	4	32,782,605	2.88	15,319,987	2,354,532	11,040,260	11,125,488	2,162,014
Kentucky, Missouri Tennessee, Texas, West Virginia	8	22,342,770	2.77	9,093,750	632,427	8,268,648	7,833,861	3,707,873
Ohio	10	29,450,630	2.76	21,115,040	353,614	18,861,760	19,068,654	3,889,779
Pennsylvania	12	82,059,576	3.04	77,849,011	2,381,278	68,588,225	69,761,320	15,958,080
Total 1965	58	262,700,991	2.91	193,583,791	7,715,104	166,888,899	168,914,902	37,113,507
At merchant plants	12	16,380,511	2.19	11,431,596	1,052,239	10,103,343	10,302,596	2,101,122
At furnace plants	46	246,320,480	2.98	182,152,195	6,662,865	156,785,556	158,612,306	35,012,385
Total 1964	58	248,668,967	2.92	192,231,020	7,184,348	165,169,106	161,645,370	33,070,273

[1] Number of plants that recovered crude light oil.
[2] Includes small quantity of material also reported in sales of crude light oil in table 42.
[3] Excludes 69,537,365 gallons of crude light oil valued at $9,441,078 sold as such.
[4] Included with "Kentucky, Missouri, Tennessee, Texas, West Virginia" to avoid disclosing individual company data.

Table 52.—Yield of light-oil derivatives from refining crude light oil at oven-coke plants in the United States

(Percent)

Year	Benzene (all grades)	Toluene (all grades)	Xylene (all grades)	Solvent naphtha (crude and refined)	Other light-oil products
1929	67.2	9.4	(1)	3.7	3.4
1939	64.0	12.1	2.5	2.9	3.8
1949	65.1	12.5	3.3	2.3	3.2
1957–59 (average)	60.9	13.5	3.9	2.1	2.3
1962	61.4	14.4	4.0	2.3	2.2
1963	62.1	13.9	3.7	1.9	2.4
1964	62.3	13.3	3.7	2.3	4.3
1965	63.0	12.8	3.5	2.8	4.1

[1] Included with "Solvent naphtha (crude and refined)."

quantities of tar topped and burned, as well as the quantities sold, depend upon a number of economic factors such as the availability and current market prices of tar, tar distillates, and other substitute fuels. Merchant plants normally sell tar because they have no use for the pitch which makes up the bulk of the products recovered through topping.

Although most of the plants that processed tar in 1965 recovered only a crude chemical oil and pitch, two plants distilled tar and recovered other tar derivatives, including creosote oil, cresylic acid, cresols, naphthalene, phenol, pyridine, and medium and hard pitch. Statistics on these products could not be shown in this report but were transmitted to the U.S. Tariff Commission which published them combined with similar data from tar distillers and petroleum refiners, in monthly and annual reports on synthetic organic chemicals.

The total value of crude tar and derivatives used and sold was $95.8 million, an increase of 1 percent over the value of 1964.

CRUDE LIGHT OIL AND DERIVATIVES

Light oil is a light-colored liquid, composed of a number of aromatic hydrocarbons, that is extracted from the gas after tar, ammonia, and, in some instances, naphthalene, have been removed. Crude tar also contains a small amount of light oil, but this usually is not recovered by coke plants. Virtually all light oil produced at coke plants is recovered by an absorption process in which the gas is sprayed with a higher boiling petroleum oil as the gas stream is channeled through absorption towers. After recovery, light oil is separated from the absorption oil by direct steam distillation.

Approximately 3 gallons of light oil, equal to 1 percent of the weight of the coal, is recovered for each ton of coal carbonized. Yields vary, of course, with the kinds of coals carbonized and with operating conditions, but an average of 2.91 gallons of light oil was recovered at the plants that extracted light oil in 1965. Most plants recover light oil, but a few plants which find it uneconomical to remove the light oil, leave it in the gas to be burned as fuel.

Of the 65 active oven-coke plants, 58 recovered light oil. Yields per ton of coal decreased slightly at both furnace and merchant plants, but total production increased 6 percent over that of 1964 because a larger amount of coal was carbonized. Yearend stocks increased approximately 500,000 gallons, but the amount on hand on December 31 was equivalent to only a little more than 1 week's production. Producers continued to sell an increasingly larger part of their output, and only 74 percent of the light oil produced was refined on the premises, or in affiliated plants, compared with 77 percent in 1964 and 94 percent in the period spanning the years 1957–59. The large increase in light oil sales in recent years is attributed principally to the inability of some plants to produce derivatives, particularly benzene, that meet the more rigid specifications established for these products. Such plants sell light oil to petroleum-refining companies which process it along with petroleum fractions into benzene and a number of other chemical intermediates.

Data on light oil and total derived products produced and sold in the various States are shown in table 51.

In the older light-oil-refining facilities at coke plants light oil is refined by fractional distillation at atmospheric pressures, but in plants built in recent years, catalytic-pressure refining is employed to produce benzene, toluene, xylene, and solvent naphtha. As with other coal-chemical materials, yields vary somewhat, but approximately 85 percent of the light oil processed is recovered as salable products. Average yields for toluene and xylene, and other products decreased slightly in 1965, while the average benzene and solvent-naphtha yields increased. Average yields for 1965 and prior years are shown in table 52.

Table 53 shows the quantities of the various grades of benzene and toluene produced at coke plants, while table 54 shows the principal light-oil derivatives produced and sold and yields of the various products by State. Roughly, 97 percent of the benzene and most of the toluene was specification grade. In past years large amounts of motor-grade benzene were produced for use in gasolines to increase their antiknock properties, but new petroleum-refining techniques have virtually eliminated this use for benzene, and only a small quantity of motor-grade benzene was produced in 1965. Both production and sales of benzene and solvent naphtha (all grades) increased for the year, but toluene and xylene outputs and sales declined.

Although coke-oven light oil was the principal source of benzene until 1950, and the source of virtually all toluene and xylene until World War II, it now supplies only a small part of the total output of these products. According to preliminary data published by the U.S. Tariff Commission, only 15 percent of the benzene, 5 percent of the toluene, and 2 percent of the xylene was produced by coke-oven operators in 1965. These products now are derived principally from petroleum, although a part of the production credited to tar distillers and petroleum processors was derived from coke-oven light oil that was sold by producers to petroleum processors for refining.

Table 53.—Benzene and toluene produced at oven-coke plants in the United States, by grade
(Gallons)

Year	Benzene: Specification grades (1°, 2°, 90 percent)	Benzene: Other Industrial grades	Toluene: Specification grades (1°, 2°)	Toluene: Other grades
1941	33,700,900	110,554,600	27,958,300	1,378,900
1949	120,706,000	22,959,300	27,125,500	545,100
1957–59 (average)	133,927,400	6,434,100	31,007,100	(1)
1962	113,894,400	2,119,000	27,230,700	(1)
1963	111,771,500	3,562,900	25,794,400	(1)
1964	116,291,700	3,516,400	25,520,500	(1)
1965	117,990,500	3,926,700	24,815,800	(1)

[1] Included with "Specification grades (1°, 2°)" to avoid disclosing individual company data.

Table 54.—Light-oil derivatives produced at oven-coke plants in the United States and sold in 1965, by State
(Gallons)

State	Benzene (all grades): Produced	Benzene: Yield from crude light oil refined (percent)	Benzene: Sold: Quantity	Benzene: Sold: Value	Toluene (all grades): Produced	Toluene: Yield from crude light oil refined (percent)	Toluene: Sold: Quantity	Toluene: Sold: Value
Alabama	10,348,776	64.2	10,781,959	$2,482,224	1,917,314	11.9	1,754,797	$297,359
California, Colorado, Utah	7,394,697	64.8	8,143,133	(1)	1,062,482	9.3	1,203,796	(1)
Illinois and Michigan	8,181,082	74.7	8,265,406	1,941,108	1,120,833	10.2	1,180,342	232,252
Indiana	8,024,376	52.4	8,668,858	3,391,618	1,794,031	11.7	1,766,163	540,053
Maryland and New York	22,707,465	71.6	22,742,308	5,364,361	2,597,345	8.2	2,870,965	539,031
Ohio	13,956,004	66.1	14,321,087	2,989,616	3,276,276	15.5	3,321,158	604,396
Pennsylvania	45,436,497	58.4	48,648,164	12,170,767	11,649,564	15.0	11,595,346	2,160,955
Tennessee, Texas, West Virginia	5,868,257	65.3	5,878,250	1,311,995	1,397,917	15.6	1,393,943	247,983
Total 1965	121,917,154	63.0	127,449,165	29,651,689	24,815,762	12.8	25,086,510	4,622,029
At merchant plants	7,269,231	63.6	7,455,738	1,642,825	1,529,534	13.4	1,552,101	292,864
At furnace plants	114,647,923	62.9	119,993,427	28,008,864	23,286,228	12.8	23,534,409	4,329,165
Total 1964	118,944,204	61.9	119,070,201	25,262,753	25,520,509	13.3	25,529,772	4,728,900

State	Xylene (all grades): Produced	Xylene: Yield from crude light oil refined (percent)	Xylene: Sold: Quantity	Xylene: Sold: Value	Solvent naphtha (crude and refined): Produced	Solvent naphtha: Yield from crude light oil refined (percent)	Solvent naphtha: Sold: Quantity	Solvent naphtha: Sold: Value
Alabama	463,388	2.9	489,101	$118,777	98,276	0.6	96,095	$20,272
California, Colorado, Utah	393,454	3.4	366,025	(1)	446,655	3.9	447,233	(1)
Illinois and Michigan	125,803	1.1	139,544	28,876	(1)	1.1	(1)	(1)
Indiana	356,920	2.3	371,035	157,398	477,128	2.9	68,240	108,311
Maryland and New York	463,719	1.5	736,735	167,709	(2)	1.7	(2)	(2)
Ohio	778,915	3.7	764,119	176,441	664,345	3.1	662,290	119,326
Pennsylvania	3,726,194	4.8	3,669,759	791,632	3,734,017	4.0	3,304,258	620,712
Tennessee, Texas, West Virginia	432,581	4.8	376,658	82,182	(2)	0.7	(2)	(2)
Total 1965	6,740,974	3.5	6,912,976	1,523,015	5,420,421	2.8	4,578,116	868,621
At merchant plants	336,834	2.9	329,217	81,434	41,431	0.4	42,080	8,823
At furnace plants	6,404,140	3.5	6,583,759	1,441,581	5,378,990	3.0	4,536,036	859,798
Total 1964	7,119,398	3.7	7,135,350	1,616,517	4,483,899	2.3	4,192,686	838,583

[1] Included with Indiana.
[2] Included with Pennsylvania.

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Table 55 shows estimated consumption of commercial benzene in the United States, by use. These data, published annually by the Coal-Chemicals Committee of the American Coke and Coal Chemicals Institute, show that most of the benzene was used for producing styrene, synthetic phenol, and cyclohexane. Nearly 40 percent of the estimated 845 million gallons of benzene used in 1965 was used in making styrene monomer, which subsequently was used principally for producing polystyrene resins and synthetic rubber. About one-fifth of the benzene was used for producing cyclohexane, which is used principally as a nylon intermediate, and 19 percent was used for producing synthetic phenol, used principally for phenolic and epoxy resins, nylon 6, and polycarbonates.

Similar use data for toluene were not available, but large quantities were dealkylated to benzene which, currently, is in greater demand. Large quantities of toluene are used also as an additive to increase the octane rating of aviation and motor gasoline. This use has declined somewhat in importance, however, because of the increased number of compact cars in use, and the replacement of propeller-type airplanes by jets. Other uses for toluene are chemicals, plastics, explosives, paints, varnishes, lacquers, and solvent.

Average receipts per gallon, f.o.b. plant, for sales of light oil derivatives other than benzene were slightly lower than in 1964. The heavy demand for benzene during the year resulted in an average plant price increase of $0.02 per gallon between January and December. Spot prices, f.o.b. plant, as published by trade journals, revealed that benzene prices ranged from $0.25 per gallon in January to $0.26 to $0.27 in December, while toluene and xylene were sold at $0.21 per gallon and $0.25 to $0.26 per gallon, respectively, throughout the year.

Table 55.—Estimated consumption of commercial benzene (excluding motor grade) in the United States, by use [1]

(Thousand gallons)

	1957–59 (average)	1962	1963	1964 r	1965 [2]
Styrene	160,000	224,000	232,000	283,000	325,000
Phenol (synthetic)	74,000	106,000	121,000	146,000	161,000
Dodecylbenzene	36,000	40,000	37,000	31,000	34,000
Cyclohexane	30,000	65,000	120,000	117,000	174,000
Aniline	14,000	17,000	19,000	21,000	24,000
DDT	14,000	16,000	17,000	12,000	14,000
Dichlorobenzene and monochlorobenzene	11,000	16,000	19,000	20,000	20,000
Maleic anhydride	9,000	15,000	14,000	20,000	21,000
Benzene hexachloride	3,000	1,000	—	—	—
Diphenyls	4,500	5,000	5,000	5,000	5,000
Nitrobenzene	2,000	2,000	2,000	2,000	2,000
Miscellaneous	21,500	17,000	20,000	20,000	20,000
Exported	7,000	41,000	65,000	87,000	45,000
Total	386,000	565,000	671,000	764,000	845,000

r Revised.
[1] Coal-Chemicals Committee, American Coke and Coal-Chemicals Institute, Washington, D.C.
[2] Preliminary figures.

Fuel Briquets and Packaged Fuel

By Eugene T. Sheridan [1]

CONTENTS

GENERAL SUMMARY

Production of fuel briquets increased slightly in 1965, checking a trend in which output has decreased each year of the past decade. Packaged-fuel production, however, continued to decline, and output was about 10 percent less than in 1964.

There were 10 briquet plants and 7 packaged-fuel plants in operation. Both industries operated throughout the year at greatly reduced rates. Output of the briquet industry was only 16.8 percent of total capacity, while the packaged-fuel industry operated at only 11.4 percent of its rated capacity.

Both fuels had higher plant values than in 1964. Briquets increased an average of $0.68 per ton, and packaged fuel increased an average of $0.89 per ton. The average value per ton of briquets, f.o.b. plant, was $17.15; that of packaged fuel was $25.15. The total value of briquet shipments, f.o.b. plant, was $6.2 million; the value of packaged-fuel shipments at the same marketing level was $210,000.

[1] Mineral specialist.

Table 1.—Salient fuel-briquet and packaged-fuel statistics

	1957–59 (average)	1962	1963	1964	1965
Fuel briquets:					
United States:					
Production------short tons--	1,002,054	570,023	551,207	359,232	360,734
Shipments [1]---------do----	999,444	569,913	551,459	360,015	362,847
Value of shipments---------	$13,471,783	$8,597,021	$8,207,989	$5,928,475	$6,223,529
Average per ton, f.o.b. plant-----------------	$13.48	$15.08	$14.88	$16.47	$17.15
Imports--------short tons--	406	8,396	4,620	11,593	12,621
Exports-------------do----	58,294	18,596	12,380	17,857	88,506
Consumption, apparent [2] short tons--	941,556	559,713	543,699	353,751	286,962
World production--------do----	117,000,000	r 131,200,000	133,900,000	r 133,300,000	128,400,000
Packaged fuel:					
United States:					
Production-----------do----	38,923	17,439	14,215	9,322	8,341
Shipments-----------do----	38,432	17,259	14,555	9,955	8,333
Value of shipments---------	$868,112	$394,065	$340,021	$241,462	$209,570
Average per ton, f.o.b. plant-----------------	$22.59	$22.83	$23.36	$24.26	$25.15

r Revised.
[1] Includes briquets used by producers.
[2] Shipments plus imports minus exports. Import and export data do not include briquets made from petroleum products.

SCOPE OF REPORT

The data presented in this report include only briquetted fuels made from anthracite, semianthracite, bituminous coal, petroleum coke, and lignite char. Specifically excluded were briquets produced from wood and nut-shell charcoal, because these materials are forest products not within the scope of the Bureau's mineral commodity programs.

Except where noted, this report was compiled from data submitted voluntarily by producers. All known producers of both industries were canvassed, and the reported production should account for the total output of fuel briquets and packaged fuel in the United States.

Data on fuel-briquet production and shipments were shown by geographic regions to avoid revealing individual plant data in States with less than three producers. The Eastern region included only West Virginia; the Central region, Michigan and Wisconsin; and the Western region, Missouri and North Dakota.

Plant capacity refers to the total maximum quantity of fuel that each industry could produce if all active plants, working their regular number of hours per day but allowing for unavoidable shutdowns, operated at their maximum rate for a year. The capacities shown accounted for the entire known capacity of both industries, since no idle plants were reported in 1965.

"Consumption" and "distribution" were used synonymously because it was assumed that, except for exports, the fuels were consumed in the States where shipped by producers.

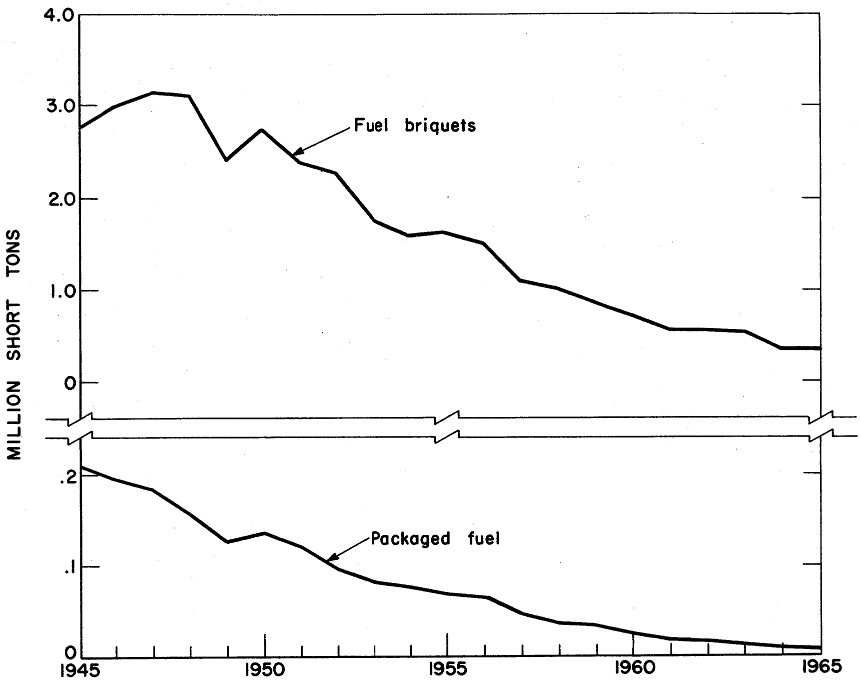

Figure 1.—Production of fuel briquets and packaged fuel in the United States, 1945–65

FUEL BRIQUETS

CAPACITY

Ten plants with a total maximum annual productive capacity of 2.1 million tons were active in 1965. This was the same capacity for the industry that was reported in 1964.

The capacity of individual plants ranged from less than 100,000 tons to more than 500,000 tons. All plants, however, operated at reduced rates during the year, and the production rate of the industry was only 16.8 percent of its rated capacity.

Data on capacity and operating rates are shown in table 2.

Table 2.—Annual capacity and production of fuel-briquet plants in the United States

	Active plants	Annual capacity (short tons)	Production	
			Short tons	Percent of capacity
1961	12	2,344,500	572,264	24.4
1962	11	2,307,500	570,023	24.7
1963	11	2,327,500	551,207	23.7
1964	10	2,143,500	359,232	16.8
1965:				
Plants with capacity of—				
Less than 25,000 tons				
25,000 to less than 100,000 tons	2	(1)	(1)	(1)
100,000 to less than 200,000 tons	5	643,500	165,877	25.8
200,000 to less than 400,000 tons				
400,000 or more tons	3	1,500,000	194,857	13.0
Total	10	2,143,500	360,734	16.8
Plants with production of—				
Less than 5,000 tons	1	(2)	(2)	(2)
5,000 to less than 10,000 tons				
10,000 to less than 25,000 tons	5	996,000	74,948	7.5
25,000 to less than 100,000 tons	4	1,147,500	285,786	24.9
100,000 or more tons				
Total	10	2,143,500	360,734	16.8

[1] Combined with "100,000 to less than 200,000 tons" to avoid disclosing individual company data.
[2] Combined with "10,000 to less than 25,000 tons" to avoid disclosing individual company data.

PRODUCTION

Total output of fuel briquets in 1965 was 360,734 tons, an increase of 1,500 tons over reported production in 1964. Although the increase was small, it reversed a trend in declining production in which output has decreased each year since 1955. Production has been declining since 1948, because fuel oil and natural gas moved into fuel markets in the Midwest and North Central States that formerly were supplied by solid fuels. Output in 1965 was, roughly, one-ninth that of 1947, the year of peak production, and about one-third that of the base years, 1957–59.

Ten plants in five States reported production. The same plants that operated in 1964 also produced briquets in 1965. However, the Berwind Fuel Company plant in Superior, Wisc., was sold during the year to the C. Reiss Coal Company who continued to operate the plant. The C. Reiss Coal Company also was appointed the exclusive sales agent in the upper midwest for Berwind Pocahontas Briquets produced by the Berwind Fuel Company in Berwind, W. Va.

Wisconsin remained the principal producing State, accounting for nearly one-half of the production. West Virginia, with only one plant, was second in output. Other producing States, in order of output, were Michigan, Missouri, and North Dakota.

Demand for briquets is seasonal, and several plants did not operate during the summer months. Monthly production ranged from 58,100 tons in October, when all but one plant was operating, to 4,384 tons in June.

The quantity of briquets produced and shipped, and the value of shipments, are shown in tables 3 and 4.

Table 3.—Production and shipments of fuel briquets in the United States, by region

Region	Active plants	Production (short tons)	Shipments		
			Short tons	Value	
				Total	Average
1964:					
Eastern States	1	(1)	(1)	(1)	(1)
Central States	6	210,833	213,640	$3,434,737	$16.08
Western States	3	148,399	146,375	2,493,738	17.04
Total	10	359,232	360,015	5,928,475	16.47
1965:					
Eastern States	1	(1)	(1)	(1)	(1)
Central States	6	232,204	232,294	3,801,031	16.36
Western States	3	128,530	130,553	2,422,498	18.56
Total	10	360,734	362,847	6,223,529	17.15

1 Included with "Western States" to avoid disclosing individual company data.

Table 4.—Production of fuel briquets in the United States in 1965, by month

Month	Short tons
January	42,535
February	44,659
March	28,203
April	15,332
May	6,486
June	4,384
July	5,435
August	17,243
September	49,705
October	58,100
November	43,666
December	44,986

RAW MATERIALS

Fuels. — Briquets were manufactured from seven different fuels, but more than one-half of the total fuel consumed was low-volatile bituminous coal. Most of the remainder was petroleum coke, although lignite char, high-volatile bituminous coal, semianthracite, Pennsylvania anthracite, and other anthracite were also used as briquet materials.

One-half of the plants used only one type of raw fuel. The other plants manufactured a composite briquet from several different fuels, except that one plant made a small quantity of petroleum-coke briquets in addition to briquets from other fuels.

Six plants used yard screenings as the source of part of their raw material, but 94 percent of the total raw fuel used was obtained from other sources. Most of this material came from mines and docks, but some petroleum coke was purchased specifically for briquetting. One plant carbonized lignite and used the char for briquetting.

The average value per ton of all raw fuels consumed was $8.60, a slight increase over the average 1964 value. The most costly fuel used was lignite char; the cheapest was semianthracite.

Binders.—A total of 25,751 tons of binding materials was used for manufacturing briquets. Included in this quantity was a small amount of spray oil, used by two plants for dustproofing. The most widely used binder was asphalt which was the only binding material in use at eight of the plants. One plant used a combination of asphalt and coal-tar pitch, and one plant used starch. Asphalt was preferred because it has good cohesive properties, is relatively low in cost, and is insoluble in water, thereby making briquets weatherproof. Starch was used by a plant that manufactured barbecue briquets, because asphalt is unsuitable for this type of briquet.

Excluding water, binders constituted 7 percent of the total raw materials. However, the quantities used at some plants ranged up to about 9 percent of total raw materials.

The average value per ton of all binders consumed was $29.69, and their total value was $764,606. This was about one-fifth the value of total raw materials.

The quantities and values of fuels and binders consumed in briquetting during 1965 are shown in tables 5 and 6.

Table 5.—Raw fuels used in making fuel briquets in the United States in 1965

Type	Number of plants	Used: Short tons	Used: Value: Total	Used: Value: Average
Anthracite:				
Pennsylvania	2	(1)	(1)	(1)
Other than Pennsylvania	1	(1)	(1)	(1)
Semianthracite	1	(1)	(1)	(1)
Bituminous coal:				
Low-volatile	8	194,511	$1,651,666	$8.49
High-volatile	1	(1)	(1)	(1)
Petroleum coke	5	120,761	1,006,893	8.34
Lignite char	1	(1)	(1)	(1)
Undistributed		32,410	330,528	10.20
Total	[2] 10	347,682	2,989,087	8.60

[1] Included with "Undistributed" to avoid disclosing individual company data.
[2] Some plants used more than one type of raw fuel; hence, the number of plants exceeds the total shown.

Table 6.—Quantity and value of raw materials used in making fuel briquets in the United States in 1965, by region

Region	Short tons	Value: Total	Value: Average
Fuels:			
Eastern States	(1)	(1)	(1)
Central States	227,144	$2,089,092	$9.20
Western States	120,538	899,995	7.47
Total	347,682	2,989,087	8.60
Binders: [2]			
Eastern States	(1)	(1)	(1)
Central States	17,299	461,312	26.67
Western States	8,452	303,294	35.88
Total	25,751	764,606	29.69
Fuels and binders:			
Eastern States	(1)	(1)	(1)
Central States	244,443	2,550,404	10.43
Western States	128,990	1,203,289	9.33
Grand total	373,433	3,753,693	10.05

[1] Included with "Western States" to avoid disclosing individual company data.
[2] Includes small amount of spray oil used by two plants for dustproofing.

SHIPMENTS

Briquets were shipped by producers to 39 States and the District of Columbia, but about four-fifths of the total distributed was shipped to 10 Central and North Central States. Michigan, Wisconsin, and Minnesota were the largest consumers, receiving 54 percent. Other States that received substantial tonnages were Indiana, Virginia, South Dakota, Ohio, and Missouri.

Nearly three-fourths of the shipments were by rail, but the mode of transportation varied with the producing region. Virtually all briquets produced in West Virginia were shipped by rail, because most markets were too distant for bulk trucking. Most of the Central States' shipments were by rail also, except for a few States that retained most of their output and delivered principally by truck.

Except for barbeque briquets and a small quantity of conventional heating and cooking briquets that were sold in bags, briquets were shipped as bulk fuel. Shipments by State of origin are not shown because of the small number of producing companies in each State. The destination of briquets used and sold by producers in 1965 is shown in table 7; table 8 shows transportation methods.

VALUE AND PRICE

The total value of shipments, based upon an average price of $17.15 per ton, f.o.b. plant, was $6,223,529. This was a 5-percent increase in total value, which was caused by a small increase in the number of briquets shipped and an increase of $0.68 per ton in the average unit value of shipments.

Plant prices varied with the area of production and were lowest in the Eastern region where production was at the mine. Briquets produced in the Central and Western regions had substantially higher values because they were produced, for the most part, from fuels from other areas. East-

Table 7.—Destination of fuel briquets used and sold by producers [1]
(Short tons)

Destination	1964	1965
Arizona	170	661
California	3,560	5,758
Colorado	350	926
Connecticut	180	441
District of Columbia	52	105
Florida	52	----
Hawaii	60	495
Idaho	10	49
Illinois	10,018	8,960
Indiana	24,472	21,949
Iowa	9,230	10,003
Kansas	940	742
Kentucky	1,972	1,747
Maine	----	232
Maryland	803	258
Massachusetts	390	1,097
Michigan	71,113	74,068
Minnesota	47,912	60,945
Missouri	18,709	15,857
Montana	90	229
Nebraska	1,973	1,615
Nevada	20	----
New Hampshire	53	366
New Jersey	1,930	----
New Mexico	100	261
New York	1,815	2,280
North Carolina	14,923	11,290
North Dakota	17,006	14,401
Ohio	19,363	17,497
Oklahoma	40	93
Oregon	340	491
Pennsylvania	414	945
Rhode Island	10	215
South Carolina	349	319
South Dakota	16,553	17,678
Tennessee	494	443
Texas	520	483
Utah	330	460
Virginia	23,123	19,846
Washington	1,436	2,019
West Virginia	105	79
Wisconsin	57,630	61,145
Wyoming	5	223
Total	348,615	356,671
Exported	11,400	6,176
Grand total	360,015	362,847

[1] Based upon reports from producers showing destination of briquets used and sold.

Table 8.—Shipments of fuel briquets in the United States, by method of transportation [1]
(Short tons)

Origin	1964			1965		
	Rail	Truck	Total	Rail	Truck	Total
Eastern States	(2)	(2)	(2)	(2)	(2)	(2)
Central States	134,853	78,787	213,640	143,761	88,533	232,294
Western States	126,525	19,850	146,375	114,731	15,822	130,553
Total	261,378	98,637	360,015	258,492	104,355	362,847

[1] Includes shipments destined for export as reported by producers directly to the Bureau of Mines.
[2] Included with "Western States" to avoid disclosing individual company data.

ern briquets, however, were shipped to more distant markets, and transportation costs were reflected in the price of the briquet rather than in the raw fuel. In most instances, briquets produced and sold in Central and Western States were competitively priced at the retail level with those from the East.

The values of briquet shipments, f.o.b. plant, from the various producing areas are shown in table 3. Because a relatively small quantity of briquets are distributed, wholesale and retail prices of briquets are not quoted by the coal trade journals and are generally unavailable.

FOREIGN TRADE

As in past years, foreign trade in briquets was relatively small. Exports, as reported by producers and shown in table 7, comprised only 2 percent of the briquets distributed; however, total exports were somewhat larger, because briquets were shipped also to other countries by exporting firms.

Table 10 shows export data on briquets for 1963, 1964, and 1965, as compiled from records of the Bureau of the Census, U.S. Department of Commerce. The data for 1965 show a substantial increase in shipments over the 2 previous years, but the quantities shown are not comparable with those of 1963 and 1964 because a new commodity classification, which included shipments of raw lignite, was used. The data for 1965 also reflect substantially larger shipments to a number of countries than the quantities that actually were shipped because imputation methods were used in machine processing of the data.

The same classification criteria apply to imports of briquets. All imports came from Canada, and it is believed that only coal and coke briquets were included in the data.

Table 9.—Fuel briquets (coal and coke) imported for consumption in the United States, by country and customs district

Country and customs district	1963		1964		1965	
	Short tons	Value	Short tons	Value	Short tons	Value
Canada:						
Buffalo	140	$7,000				
Dakota	1,289	18,957	5,867	$89,607	5,500	$80,450
El Paso					29	439
Hawaii	127	6,879				
Michigan	36	1,687			10	858
Montana and Idaho	3,028	47,300	5,726	92,186	7,082	122,866
Total	4,620	81,823	11,593	181,793	12,621	204,613

Source: Bureau of the Census.

Table 10.—Fuel briquets (coal and coke) exported from the United States, by country of destination and customs district

	1963		1964		1965	
	Short tons	Value	Short tons	Value	Short tons	Value
Country or area:						
North America:						
Bahamas	14	$206			51	$564
Bermuda					375	4,116
Canada	9,062	125,257	15,911	$182,992	13,623	151,277
Dominican Republic	831	12,849	344	4,898		
Guatemala			79	1,120		
Honduras			22	302		
Jamaica	14	200			70	766
Mexico	286	3,939	341	4,844	68,626	752,121
Netherlands Antilles					129	1,418
Total	10,207	142,451	16,697	194,156	82,874	910,262
South America:						
Brazil			268	3,818		
Chile			250	3,388	90	9,043
Colombia	608	8,594				
Ecuador					19	208
Paraguay	69	976	74	970		
Surinam					3,745	205,975
Venezuela	179	2,541	138	1,920	755	8,306
Total	856	12,111	730	10,096	4,609	223,532
Europe:						
Germany, West	425	6,000	57	800	868	9,559
Spain	45	640				
United Kingdom			59	842	86	949
Total	470	6,640	116	1,642	954	10,508
Africa: Nigeria					12	3,880
Asia:						
India			163	2,217		
Indonesia			47	673		
Japan	(1)	(1)				
Philippines			64	898		
Saudi Arabia	119	1,689				
Total	119	1,689	274	3,788		
Oceania:						
Australia	728	43,973			57	631
New Zealand			40	564		
Total	728	43,973	40	564	57	631
Grand total	12,380	206,864	17,857	210,246	88,506	1,148,813
Customs district:						
Buffalo	400	6,070	1,450	21,580	2,036	22,394
Dakota	1,762	25,870	1,211	18,864	3,290	39,336
Duluth and Superior	1,583	23,053	2,170	30,130	650	9,622
El Paso	67	836				
Florida	28	406			180	1,982
Galveston	170	2,564			4,187	210,834
Laredo	156	2,203	169	2,404	68,429	749,955
Los Angeles	728	43,973			57	631
Maryland					1,243	13,675
Michigan	4,267	57,644	3,250	44,410	3,713	40,855
Mobile	661	10,285	344	4,898		
Montana and Idaho					3,064	29,501
New Orleans	69	976	175	2,392	479	9,021
New York	951	13,464	970	13,478	176	9,992
Ohio	425	6,000	7,600	64,916		
Philadelphia			59	842		
St. Lawrence	1,050	12,620	287	3,892	280	3,079
San Diego	63	900	172	2,440	132	1,446
Washington					590	6,490
Total	12,380	206,864	17,857	210,246	88,506	1,148,813

(1) Less than 1 ton.

Source: Bureau of the Census.

TECHNOLOGY

Recent studies in Germany[2] have shown that briquets with increased break resistance can be produced with smaller amounts of pitch binder if the coal base is wetted prior to briquetting with an emulsion of tar oils, sulfite waste liquor, and water. The emulsion, which comprises from 1.0 to 3.5 percent of the coal mix, contains 20 percent tar or anthracene oil, 20 percent sulfite waste, and 60 percent water. After thorough mixing, pitch binder is added and the mixture briquetted. An increase in mixing efficiency led to a reduction in the pitch necessary for optimal bonding. Pitch consumption dropped from 5.2 percent to 4.7 percent with large-scale production. The reduced pitch consumption was accompanied by a 30-percent increase in break resistance, less caking in mixing and kneading machines, less dust during production and storage, and much less smoke and soot formation during burning.

British Patent 992,155 describes a method[3] for increasing the mechanical strength and weather resistance of briquets made with a sulfite-pulp liquor binder. The process involves the use of 0.3 percent by weight, on a total mixture-weight basis, of sodium dichromate, which may be added to either the sulfite liquor, or to the mixture, before briquetting. The best results are obtained with an aqueous solution of sodium dichromate.

A method[4] for reducing the amount of binder required for briquetting bituminous coal is described in German Patent 1,178,-820. In this process, coal particles, pulverized to 30- to 40-percent dust size, are heated and introduced into a mixer where they are fluidized by two counter-rotating fans. The binder, which usually is coal-tar pitch in an amount equal to 2 to 5 weight-percent of the coal, is uniformly distributed in the mix by heating and spraying it at 20 atmospheres into the mixer. The mixture is then heated at about 250° to activate the binder and, finally briquetted.

A new briquetting process developed in France[5] uses a 12.5 weight-percent molasses binder that is mixed with finely powdered carbon in an externally heated blender. After the mixture is briquetted, the briquets are heattreated. The process produced strong, hard, briquets that emitted no obnoxious odors or fumes when burned.

Indian Patent 78,339[6] describes a method for producing briquets with an inorganic binder. This process uses slack coal, or coke breeze, which is separated into two sizes, —1/8 to 1 inch and 0 to 1/8 inch. The coarse and fine aggregates are then mixed with a portland cement binder in the ratio of 4 to 10:2 to 5.1, after which water is added and the paste molded. The molds are allowed to set for 10 to 24 hours, then the shapes are removed and cured under water for a period of 1 to 7 days. The briquets are said to be suitable for use as fuel or foundry coke.

Research conducted at the Institute of Chemical Processing of Coal in Zabrze, Poland, has resulted in the development of a two-stage process for producing coke briquets from noncoking coals.[7] In the first stage the coal is degassed at a high temperature, after which the char is briquetted. The briquets then are subjected to an oxygen and heat treatment that gives them a high-mechanical resistance.

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[2] Mueschenborn, W., and W. Schinzel. Improvement of Pitch Briquetting by the Use of an Emulsion. Glueckauf 101 (7), 1965, pp. 421–425. Chem. Abs., v. 63, No. 3, Aug. 2, 1965, col. 2806d.

[3] Schuechtermann und Kremer-Baum A.G. Fuer Aufbereitung. Binding Agent for the Briquetting of Coal. British Pat. 992,155, May 19, 1965; German Pat. Appl. Sept. 11, 1961, 2 pp.; Chem. Abs., v. 63, No. 3, Aug. 30, 1965, col. 5413h.

[4] Impact Mixing Corp Conserving Bituminous Binders in the Briquetting of Bituminous Coal. German Pat. 1,178,820, Oct. 1, 1964, App. Aug. 25, 1956, 2 pp., Chem. Abs., v. 62, No. 4, Feb. 15, 1965, col. 3,853b.

[5] Bedel, F. E. C., R. F. C. Seri, and J. P. J. P. Viel. Binder for Fuel Briquets. French Pat. 1,384,798, Jan. 8, 1965, appl. Nov. 28, 1963, 7 pp.; Chem. Abs., v. 62, No 10, May 10, 1965, col. 11592a.

[6] Biswas, N., T. V. Subramanian, M. S. Iyengar, and A. Lahiri. Coal or Coke Briquets. Council of Scientific and Ind. Res. Indian Pat. 78,389, Jan. 25, 1964, appl. Sept. 7, 1961, 10 pp.; Chem. Abs., v. 62, No. 11, May 24, 1965, 12943b.

[7] Colliery Guardian. V. 211, No. 5460, Dec. 10, 1965, p. 762.

PACKAGED FUEL

CAPACITY

Productive capacity of this industry decreased 6 percent in 1965, because two small plants discontinued operations. As with the briquet industry, the packaged-fuel industry has declined steadily because of competition from fuel oil and natural gas, and only 7 plants were in operation in 1965 compared with 70 active plants in 1946, the year of peak capacity.

Packaged-fuel plants are relatively small, and the average productive capacity of the industry was only about 10,000 tons. However, one plant was capable of producing more than 25,000 tons annually. All plants operated at reduced rates during the year, and the production rate of the industry was only 11.4 percent of its rated capacity.

Data on capacity and operating rates are shown in table 11.

Table 11.—Annual capacity and production of packaged-fuel plants in the United States

	Active plants	Annual capacity (short tons)	Production	
			Short tons	Percent of capacity
1961	16	114,300	19,180	16.8
1962	15	112,900	17,439	15.4
1963	13	113,300	14,215	12.5
1964	9	78,200	9,322	11.9
1965:				
Plants with capacity of—				
Less than 5,000 tons	4	3,390	928	27.37
5,000 to less than 10,000 tons	1	[1] 69,800	[1] 7,413	10.62
10,000 to less than 15,000 tons	1			
15,000 to less than 25,000 tons				
25,000 or more tons	1			
Total	7	73,190	8,341	11.40
Plants with production of—				
Less than 1,000 tons	5	73,190	8,341	11.40
1,000 to less than 3,000 tons	1	(2)	(2)	(2)
3,000 to less than 5,000 tons				
5,000 or more tons	1	(2)	(2)	(2)
Total	7	73,190	8,341	11.40

[1] Combined to avoid disclosing individual company data.
[2] Included with "Less than 1,000 tons" to avoid disclosing individual company data.

PRODUCTION

Packaged-fuel production continued downward, and output was about 10 percent less than in 1964. Part of the decline was caused by the discontinuance of operations at two plants in Michigan and one in Minnesota. However, six of the seven active plants had smaller outputs than in 1964.

Packaged fuel was produced in five States, but the bulk of the production came from Michigan. Other producing States were Illinois, Indiana, Ohio, and Virginia. Indiana and Michigan each had two active producers, and Illinois, Ohio, and Virginia had only one each.

Production is seasonal in this industry also, with output ranging from only 5 tons in May to 1,427 tons in March. Total output was slightly less than the combined total of fuels and binders because of breakage and other minor losses.

The quantities of packaged fuel produced, by month are shown in table 12.

RAW MATERIAL

Fuels.—All packaged fuel produced was manufactured from low-volatile bituminous coal. This fuel had an average value of \$10.21, an increase of \$0.73 per ton over the average value of fuels used in 1964.

Five plants used yard screenings as the source of all or part of their fuel, but about 90 percent of the total fuel used came from other sources, chiefly from docks and other unloading points. Three small plants used only yard screenings.

Binders.—Six plants used starch, and one plant used corn syrup as binding materials

Table 12.—Production of packaged fuel in the United States in 1965, by month

Month	Short tons
January	1,125
February	1,157
March	1,427
April	799
May	5
June	10
July	10
August	405
September	523
October	731
November	992
December	1,157

for packaged fuel. This type of binder is preferred to the petroleum- and coal-base products used for briquet binders because it is free from volatile materials that are evolved when the fuel is burned. Although starch is more costly than asphalt, it is relatively inexpensive when used as a packaged-fuel binder because only small quantities are required per unit of production. Excluding water, binders constituted 0.6 percent of the total raw materials consumed in 1965. This was an average of 11.4 pounds of binder used for each ton of packaged fuel.

The average value per ton of packaged-fuel binders was $113.85, and their total value was $5,408. This was about 6 percent of the total value of all raw materials used.

Table 13.—Quantity and value of raw materials used in making packaged fuel in the United States in 1965

	Short tons	Value	
		Total	Average
Fuels [1]	8,341	$85,201	$10.21
Binders [2]	48	5,408	113.85
Fuels and binders	8,389	90,609	10.80

[1] Low-volatile bituminous coal.
[2] Starch.

SHIPMENTS

Packaged fuel was sold principally in the areas of production, and all shipments were trucked. In some instances, packaged fuel was sold directly to consumers at the plant where it was manufactured.

VALUE AND PRICE

The average value per ton, f.o.b. plant, of packaged fuel distributed in 1965 was $25.15, a 4-percent increase over the 1964 value. The total value of shipments, however, decreased 13 percent because the shipped quantity of packaged fuel declined.

The average plant value of packaged fuel was $8 greater than the f.o.b. plant price of fuel briquets, but the values are not comparable because the products and the manner in which they are marketed are different. Because most briquets were sold in bulk for residential heating, their prices were largely competitive with other quality bulk solid fuels. Also, briquets were sold principally through regular wholesale and retail channels, and the actual price to the customer was somewhat greater than the plant value. Packaged fuel is a specialty item, sold mostly in small quantities directly to the consumer by the producer, and the plant value generally is equal to the retail price.

The value of packaged-fuel shipments in 1965 is shown in table 1.

WORLD REVIEW

Total world production of briquetted fossil fuels in 1965 was estimated at 128 million short tons, a 4-percent decrease from the estimated quantity produced in 1964. Most of the decrease was caused by a smaller output of anthracite, bituminous and lignite briquets in West Germany.

Virtually all European countries produced briquets, and Europe's output was 90 percent of the world total. East Germany, the largest briquet producer, accounted for 60 percent of Europe's production and 53 percent of the world total. Virtually all East German briquets were made from lignite, which is the principal fuel produced in East Germany. It is estimated that approximately one-fourth of the lignite output of West Germany was converted into briquets, which were used extensively for residential and industrial heating. Some lignite briquets were carbonized and used also in metallurgical applications.

West Germany ranked second in output with 15 percent of the world production. About three-fourths of the West German briquets were made from lignite; the remainder from bituminous coal and anthracite. Briquets were used extensively in West Germany, also, as household and industrial fuel, but more than 1 million tons of West German briquets were exported to other European countries.

Ranking third in world production, the U.S.S.R. had an estimated 7 percent of the world output. Data were not available on the quantities of different fuels briquetted, but, in addition to briquets manufactured from bituminous coal and anthracite, large quantities were produced from peat. As in other European countries, briquets contributed substantially to the total fuel requirement of the Soviet Union.

France, with 5 percent of the world total, ranked fourth in European output but fifth in world production, following Korea, which was the fourth largest producer of briquets. Most of the French briquets were made from bituminous coal and were used within the country. France also imported nearly 1 million tons of briquets in 1965, principally from Belgium, Luxembourg, the Netherlands, and West Germany.

Other European countries with substantial production were Belgium, Bulgaria, Hungary, the Netherlands, Spain, and the United Kingdom. Each produced more than 1 million tons, and their combined output was 6 percent of the world total.

Nine percent of all briquets were produced in Asia, chiefly in Japan and in the Republic of Korea. Both countries used large quantities of briquets for domestic cooking and heating.

The United States, with 0.3 percent of the world production, ranked 16th in output.

Production, by countries, is shown in table 14.

Table 14.—World production of fuel briquets and packaged fuel, by countries
(Thousand short tons)

Country	1961	1962	1963	1964	1965 p
North America:					
Canada	67	56	72	r 60	69
United States:					
Briquets	572	570	551	359	361
Packaged fuel	19	17	14	9	8
Total	658	643	637	r 428	438
Europe:					
Belgium	1,290	1,756	r 2,529	r 1,580	e 1,215
Bulgaria e	440	1,100	1,380	1,700	1,700
Czechoslovakia:					
Bituminous	166				
Lignite	793	868	858	r 864	e 860
Denmark	62	61	r 67	r 44	e 44
Finland	10	7	20	r 19	e 22
France	6,714	7,660	8,834	r 7,302	6,403
Germany:					
East, Lignite	63,930	65,838	66,421	r 67,796	e 68,345
West:					
Anthracite and bituminous	5,367	6,242	7,003	5,962	e 5,195
Lignite	17,102	17,383	17,454	16,927	e 13,985
Greece	73	89	155	r 176	e 176
Hungary	1,254	1,311	r 1,351	r 1,262	e 1,262
Ireland [2]	233	266	r 315	316	e 314
Italy, Anthracite	32	65	141	r 80	e 35
Netherlands:					
Anthracite and bituminous	1,310	r 1,509	1,721	1,495	1,487
Lignite	82	78	69	73	51
Poland:					
Bituminous	744	721	704	r 683	672
Lignite	373	380	392	r 419	375
Portugal	42	50	r 50	r 45	e 35
Rumania e	330	330	330	330	330
Spain	1,232	1,364	1,315	r 1,162	e 1,155
Sweden	68	47	r 67	e r 66	e 55
U.S.S.R. e	9,400	9,400	9,400	9,600	9,600
United Kingdom	1,645	1,734	1,851	1,489	e 1,325
Yugoslavia	6	3	18	r 4	e 6
Total	112,700	r 118,300	r 122,450	r 119,400	114,650
Africa:					
Algeria	45	e 18			
Morocco	26	25	20	20	e 19
Tunisia e	7	8	8	8	
Total	78	51	28	28	e 19
Asia:					
Afghanistan	21	e 21	e 22	e 22	e 2 15
Indonesia e	11	11	11	11	11
Japan	4,529	4,605	4,740	4,500	e 4,410
Korea, South	e 4,400	5,460	3,805	r 6,587	e 6,600
Pakistan e	22	22	22	22	22
Turkey	74	17	e 17	r 61	e 61
Viet-Nam, South e	61	61	61	61	55
Total	9,100	10,200	8,700	r 11,300	11,200
Oceania:					
Australia	2,062	2,002	2,113	2,078	e 2,094
New Zealand	17	13	12	r 17	e 17
Total	2,079	2,015	2,125	r 2,095	e 2,111
World total (estimate)	124,600	r 131,200	133,900	r 133,300	128,400

e Estimate. p Preliminary. r Revised.
[1] Includes briquets made from coal, lignite, and peat. Data do not add to totals shown because of rounding.
[2] Year ended March 31 of year following that stated.

Peat

By Eugene T. Sheridan [1]

GENERAL SUMMARY

Peat production declined 7 percent in 1965, halting a trend during which production had increased each year since 1956. The decrease was attributed principally to an unusually wet harvesting season in a number of States.

There were 146 active operations in 26 States. The principal producing State was Michigan, which had 38 percent of the total production and 27 producers. Pennsylvania, New Jersey, Indiana, Illinois, Colorado, and California followed in output in the order named. These States, with Michigan, had about three-fourths of the total production.

Fifty-three percent of the output was reed-sedge peat; about one-quarter was humus; and the remainder was moss peat. Seventeen percent was sold as excavated, and the remainder was processed by shredding or pulverizing, screening, and, in a few instances, thermal drying.

Virtually all peat was sold for agricultural and horticultural purposes. Ninety-six percent of the total was reported by producers as sold for general soil-improvement purposes.

Fifty-one percent of the peat sold was packaged, and 49 percent was sold in bulk. More than one-half of the packaged peat was produced in Michigan. Most of the remainder came from Indiana, Illinois, California, New Jersey, and New York.

The total value of commercial sales was \$6.1 million. The average value per ton of all peat sold was \$10.07.

Imports increased 2 percent because of increased shipments from Canada. Imports from Europe declined.

World production was estimated at 205 million short tons. The U.S.S.R. was the largest producer, with an estimated 89 percent of the total world output.

[1] Mineral specialist, Division of Bituminous Coal.

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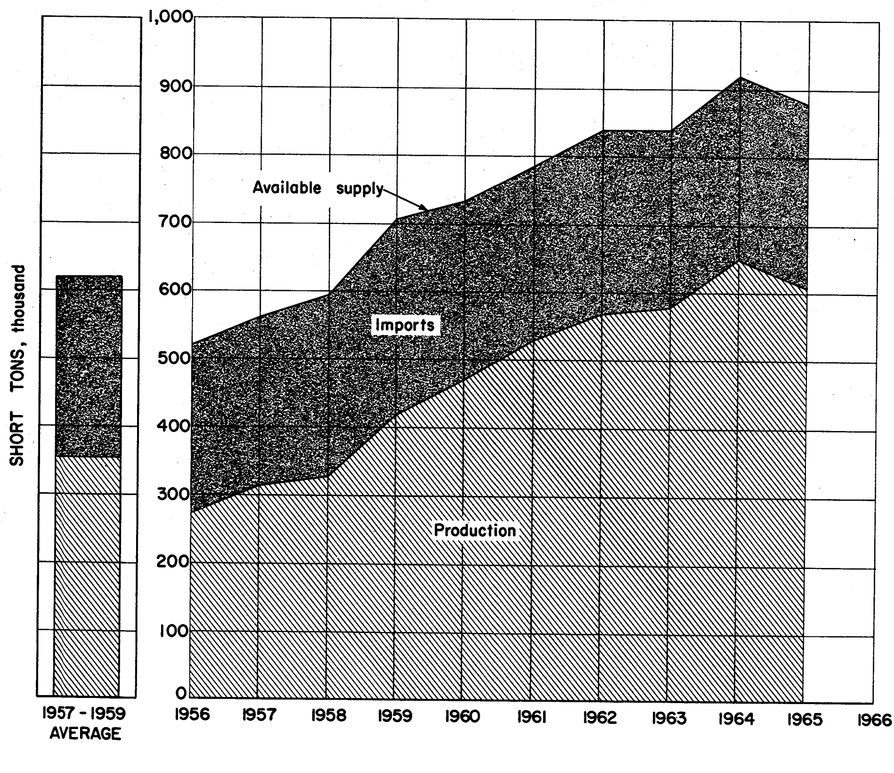

Figure 1.—Production, imports, and available supply of peat in the United States, 1956–65.

Table 1.—Salient peat statistics

	1957–59 (average)	1962	1963	1964	1965
United States:					
Number of operations	87	117	113	r 142	146
Production short tons	354,497	571,873	578,530	r 649,033	604,082
Commercial sales do	342,711	566,441	546,621	r 639,690	603,746
Value of sales	$3,556,218	$5,185,627	$5,422,877	r $6,198,826	$6,079,552
Average per ton	$10.38	$9.15	$9.92	r $9.69	$10.07
Imports short tons	267,525	267,678	261,331	270,419	275,462
Available for consumption [1] short tons	610,236	834,119	807,952	r 910,109	879,208
World production do	[2] 71,100,000	r 147,400,000	r 173,000,000	r 185,600,000	204,900,000

r Revised.
[1] Commercial sales plus imports.
[2] In addition, the U.S.S.R. produced an undetermined quantity of agricultural peat.

GOVERNMENT REGULATIONS

There are no national standards in the United States for differentiating among peats according to their various chemical and physical characteristics and suitability for different uses. However, the sale of peat is governed by trade regulations, established by the Federal Trade Commission, to promote fair labeling and selling practices. In general, the regulations forbid unfair or deceptive practices in marketing, misrepresentations, and the use of deceptive trade or corporate names. They also state the requirements for labeling a product "peat" and the manner in which the terms "peat moss" and "moss peat" may be used. In addition, the rules prohibit discriminatory practices in pricing, in grants for services and facilities, and in advertising and promotional allowances.

Government purchases of peat are subject to Federal specifications, developed by the Federal Supply Service, General Services Administration. The current specification, Q-P-166e, May 10, 1961, classifies and lists the requirements for four types of peat: (1) Sphagnum-moss peat; (2) other moss peats; (3) humus peat; and (4) reed-sedge peat. The Federal Supply Service also supplies information on sampling, inspection, and testing procedures and outlines the requirements for packaging and marking containers.

SCOPE OF REPORT

This chapter, except where noted, is based upon data submitted voluntarily by producers of peat in the United States. Similar reports on the peat industry have been published each year since 1934 when the Bureau of Mines resumed the industry survey conducted from 1908 to 1926 by the U. S. Geological Survey. No data were collected or published by either agency between 1926 and 1934.

Complete coverage of the industry was attempted, and all reported production was included. No estimates were made for nonreporting companies, which were assumed to have been idle or not commercial producers. Questionnaires were mailed to all companies that reported commercial production within the past 3 years and to companies that were reported as possible peat producers. Because of the nature of the industry, this survey may have failed to reach all producers. However, all major and most of the smaller producers were canvassed, and the data include virtually all peat produced in the United States for commercial sale.

The survey revealed that there were 146 active and 21 idle peat operations in 1965. One of the idle plants sold a small amount of peat from the previous year's production. Of the other plants canvassed, 11 had been abandoned and one did not respond to the survey.

Peat is classified in this report as moss peat, reed-sedge peat, and humus. The first two types are classified according to botanical origin; the last type is classified according to degree of decomposition. Moss peat is a type that has formed predominantly from sphagnum, hypnum, or other mosses, whereas reed-sedge peat has originated principally from reeds, sedges, and associated swamp plants. Plant remains in both the moss and reed-sedge types are identifiable, but reed-sedge peat usually is more decomposed. Humus includes all peat so decomposed that its biological identity cannot be determined. These classifications are less restrictive than those of the Federal specifications governing purchases of peat by the Federal Government, but the nature of the domestic peat industry makes it impractical to make them more limiting, particularly for reporting purposes.

Unprepared peat had no processing other than air drying. Processed peat was shredded, screened, and, in some instances, artificially dried. Cultivating refers to the operation of aerating peat before excavating it by turning over the surface layer of the deposit with a disk or spike harrow.

All quantities are shown in short tons. Data on uses include peat produced in the United States only, as no information was available on the ultimate uses of imported peat.

All values for domestic peat were based upon producers' selling prices at the plant. In general, the prices did not include the cost of containers, but this cost may have been included by some producers. Values not reported by producers were estimated by using the values of similar types reported by other producers within the State.

Data on reserves have been reviewed in previous issues of this chapter and also in the Bureau of Mines Bulletin 630, Mineral Facts and Problems, 1965 edition.

PRODUCTION

Production, which has increased each year since 1956, declined 7 percent in 1965, but output still was 70 percent greater than the average quantity produced annually in the base years, 1957–59. The bulk of the decrease was caused by smaller outputs of plants in Indiana and Michigan. However, production also decreased in 15 other States. The overall decline in production was attributed, principally, to an unusually wet harvesting season, particularly in some of the larger producing States. However, five States with decreased output, also had a smaller number of active operations.

The overall decrease in output was partially offset by the production of 9 States with larger outputs than in 1964. Illinois, New Jersey, and Pennsylvania registered the largest increases, but each of these States also had a larger number of producers than in the previous year.

There were 26 peat-producing States in 1965. Production and the number of active plants in each State varied greatly. Michigan, with 27 plants, had the largest number of operations, followed by Washington with 18, Colorado with 16, and Pennsylvania with 12. These four States had one-half of the total active operations.

Except for a relatively few plants, peat operations are small, and the average output for all plants in 1965 was only about 4,150 tons. However, 55 plants (39 percent of the total) produced less than 1,000 tons, and only 4 plants produced more than 25,000 tons.

Michigan, with 38 percent of the output, was also the largest producer, followed in the order named by Pennsylvania, New Jersey, Indiana, Illinois, Colorado, and California. These seven States had about three-fourths of the total production.

Fifty-three percent of the reported production was reed-sedge peat; about one-quarter was humus; and the remainder, moss peat. Fifty-seven percent was produced by cultivation methods, and about four-fifths was subjected to processing, either shredding and/or artificial drying, before it was sold.

Production methods varied, but virtually all peat was extracted with some type of machinery. Most of the harvesting equipment consisted of conventional earth-moving and excavating machines, including power shovels, clamshells, draglines, bulldozers, and front-end loaders. However, specialized machines such as harvesters, cultivators, milling machines, and scrapers were employed also. Processing machinery included a variety of shredders, pulverizers, hammermills, grinders, screens, and artificial dryers.

Table 2 shows the types of peat produced, unprepared and processed, and table 3 shows production, commercial sales, and the number of active plants in each State.

Table 2.—Peat produced in the United States in 1965, by kind

(Short tons)

Kind	Total	Unprepared	Processed		
			Shredded only	Shredded and kiln-dried	Kiln-dried only
Moss	128,910	24,402	84,645	19,863	
Reed-sedge	320,433	20,298	298,737	1,398	
Humus	154,739	55,595	97,664	967	513
Total	604,082	100,295	481,046	22,228	513

Table 3.—Production and commercial sales of peat in the United States, by State

State	Active plants	Production (short tons)	Commercial sales		
			Short tons	Value	
				Total	Average
1964:					
Alaska	1	2,350	2,350	$18,800	$8.00
California	5	35,391	35,391	442,941	12.52
Colorado	14	27,931	27,931	187,864	6.73
Connecticut, Massachusetts, New Jersey	5	22,431	22,431	254,334	11.34
Florida	7	19,813	19,813	102,152	5.16
Georgia, Maryland, South Carolina	5	16,101	14,624	151,075	10.33
Idaho	2	6,900	900	8,000	8.89
Illinois and Iowa	7	36,843	36,843	420,272	11.41
Indiana	8	66,548	66,568	543,046	8.16
Maine	3	6,300	6,350	170,750	26.89
Michigan	29	268,913	269,074	2,412,274	8.97
Minnesota	8	17,552	19,188	405,333	21.12
Montana, Nevada, North Dakota	r 4	r 634	r 634	r 29,381	r 46.34
New York	5	32,574	32,574	261,366	8.02
Ohio	8	6,636	6,363	82,608	12.98
Pennsylvania	10	43,500	39,500	397,123	10.05
Vermont	3	303	286	4,492	15.71
Washington	15	35,017	35,609	170,497	4.79
Wisconsin	3	3,296	3,261	136,518	41.86
Total	r 142	r 649,033	r 639,690	r 6,198,826	r 9.69
1965:					
Alaska	1	1,967	1,967	(1)	(1)
California	5	30,905	30,905	433,700	14.03
Colorado	16	31,179	31,179	236,044	7.57
Connecticut, Massachusetts, Iowa	5	20,985	20,985	262,379	12.50
Florida	7	20,150	19,253	109,299	5.68
Georgia, Maryland, South Carolina	5	12,803	11,473	137,446	11.98
Idaho, Montana, Nevada, North Dakota	5	7,606	2 7,637	2 81,894	2 10.72
Illinois	6	36,774	36,774	453,448	12.33
Indiana	9	37,169	53,873	510,793	9.48
Maine	2	1,300	1,275	(1)	(1)
Michigan	27	230,787	230,950	2,133,849	9.24
Minnesota	7	10,940	7,346	123,195	16.77
New Jersey	4	40,480	40,480	430,800	10.64
New York	5	25,098	25,098	231,709	9.23
Ohio	7	5,352	5,352	80,229	14.99
Pennsylvania	12	57,378	45,600	527,285	11.56
Vermont	2	780	780	(1)	(1)
Washington	18	29,629	29,729	131,079	4.41
Wisconsin	3	2,800	3,090	121,967	39.47
Undistributed				74,436	34.75
Total	146	604,082	603,746	6,079,552	10.07

r Revised.
1 Included with "Undistributed" to avoid disclosing individual company data.
2 Includes small quantity sold from stocks of one plant that did not produce in 1965.

Table 4.—Relative size of peat operations in the United States

Size	1964				1965			
	Active plants		Production		Active plants		Production	
	Number	Percent of total	Short tons	Percent of total	Number	Percent of total	Short tons	Percent of total
Under 500 tons	r 36	r 25.4	r 8,724	1.3	33	22.6	7,055	1.2
500–999 tons	20	r 14.1	15,834	2.5	22	15.1	17,212	2.8
1,000–4,999 tons	54	r 38.0	134,517	20.7	60	41.1	135,688	22.5
5,000–14,999 tons	20	r 14.1	162,397	25.0	22	15.1	184,610	30.5
15,000–24,999 tons	7	r 4.9	117,416	18.1	5	3.4	98,251	16.3
25,000 or more tons	5	3.5	210,145	32.4	4	2.7	161,266	26.7
Total	142	100.0	649,033	100.0	146	100.0	604,082	100.0

r Revised.

CONSUMPTION AND USES

Although imports increased, a 6-percent decrease in commercial sales of domestic peat resulted in an overall decrease of 3 percent in the quantity of peat placed on the market in 1965.

Ninety-six percent of the peat marketed by domestic producers was sold for general soil improvement use. Principal markets for this peat were nurseries and greenhouses who used the material as a mulch, and for growing plants, shrubs, and trees; landscape gardeners and contractors who used peat for building lawns and golf course greens, and for transplanting trees and shrubs; and garden, chain, hardware, and variety stores who sold peat to homeowners for mulching, and for improving lawn and garden soils. The remainder was sold principally for use in potting soils and mixed fertilizers, and for packing flowers and shrubs. No peat was reported sold for fuel or energy use.

About one-half of the peat sold was in bulk, and about one-half was packaged. Both bulk and packaged sales were lower than in 1964. Total sales were nearly double the average quantity sold in 1957–59. Of the total packaged sales, more

Table 5.—Commercial sales of peat in the United States in 1965, by kind and use

Use	Moss			Reed-sedge			Humus		
	Short tons	Value		Short tons	Value		Short tons	Value	
		Total	Average		Total	Average		Total	Average
Bulk:									
Soil improvement	65,063	$524,556	$8.06	92,180	$828,798	$8.99	122,156	$752,555	$6.16
Other uses	860	5,800	6.74	7,216	73,475	10.18	7,228	60,454	8.36
Total	65,923	530,356	8.05	99,396	902,273	9.08	129,384	813,009	6.28
Packaged:									
Soil improvement	72,960	1,090,993	14.95	209,133	2,091,997	10.00	19,284	216,144	11.21
Other uses	46	1,420	30.87	5,849	286,285	48.95	1,771	147,075	83.05
Total	73,006	1,092,413	14.96	214,982	2,378,282	11.06	21,055	363,219	17.25
Total:									
Soil improvement	138,023	1,615,549	11.70	301,313	2,920,795	9.69	141,440	968,699	6.85
Other uses	906	7,220	7.97	13,065	359,760	27.54	8,999	207,529	23.06
Grand total	138,929	1,622,769	11.68	314,378	3,280,555	10.44	150,439	1,176,228	7.82

Table 6.—Commercial sales of peat in the United States in 1965, by use

Use	In bulk			In packages			Total		
	Short tons	Value		Short tons	Value		Short tons	Value	
		Total	Average		Total	Average		Total	Average
Soil improvement	279,399	$2,105,909	$7.54	301,377	$3,399,134	$11.28	580,776	$5,505,043	$9.48
Potting soils	681	8,571	12.59	4,042	254,895	63.06	4,723	263,466	55.78
Packing flowers, shrubs, etc	4,603	47,795	10.38	1,853	32,810	17.71	6,456	80,605	12.49
Seed inoculant				1,771	147,075	83.05	1,771	147,075	83.05
Mushroom beds	3,876	41,161	10.62				3,876	41,161	10.62
Earthworm culture	1,946	13,260	6.81				1,946	13,260	6.81
In mixed fertilizers	4,198	28,942	6.89				4,198	28,942	6.89
Total	294,703	2,245,638	7.62	309,043	3,833,914	12.41	603,746	6,079,552	10.07

than one-half was reed-sedge peat that was produced in Michigan. The remaining packaged peat was produced principally in Indiana, Illinois, California, New Jersey, and New York. Detailed data on bulk and packaged sales in each State were not shown because they would have disclosed individual company figures. Bulk and packaged commercial sales in 1965, by kind and use, are shown in tables 5 and 6.

VALUE AND PRICE

Although the average value of all peat sold in 1965 increased $0.38 per ton, f.o.b. plant, the total value of sales declined 2 percent because of the smaller quantity sold. The average value per ton for all peat sold was $10.07, and the total value of sales was $6.1 million.

Prices of the various kinds of peat varied greatly, as selling prices at individual plants were based principally upon the kind of peat sold, the amount of processing to which the peat was subjected, and whether the peat was sold in bulk or packaged. The overall average value of bulk peat was $7.62 per ton, but bulk prices ranged from an average of $6.81 per ton for peat sold for earthworm culture, to $12.59 per ton for peat sold for potting soils. The same applied to packaged peat, which averaged $12.41 per ton, but varied in price from $11.28 per ton for peat sold for general soil improvement to $83.05 per ton for peat sold as seed inoculant.

The total value of imported peat was $12 million, a slight decrease from the total value in 1964. This value, established at the port of embarkation, was roughly equal to prices paid by importers, less transportation and other miscellaneous charges. In some instances, ocean freight and other nondutiable charges, such as insurance, may have been included inadvertently in this value.

The average value of peat imported was $43.45, approximately $1.85 per ton less than the average value of peat imported in 1964. Most of the decrease was caused by the lower values of peat imported from Canada.

The unit value of imported peat was about 3.5 times that of packaged domestic peat, but the values are not comparable because they were assigned at different marketing levels. Also, imported peat has different physical properties than most of the peat produced in the United States, and it usually is sold on a volume basis rather than by weight. Each 100 pounds of a typical air-dried imported peat will measure approximately 12 bushels, whereas the same quantity of a typical domestic peat will measure only 3 or 4 bushels. A few U.S. peat operations, however, produce and sell peat with properties similar to the imported type.

The plant values of domestic peat sold in bulk and in packages are shown in tables 5 and 6.

FOREIGN TRADE

Imports were 2 percent greater than in 1964, and the quantity imported was the largest since 1959. Most of the increase was due to larger shipments from Canada.

Canada remained the principal source of foreign peat, supplying 87 percent of the 275,462 tons imported. Except for negligible quantities from Mexico, three South American countries, and Japan, all of the remainder was shipped from Europe.

Imports from Europe decreased 8 percent, principally because of smaller shipments from West Germany. Of the European shipments, West Germany supplied about two-thirds of the total, and Ireland, the Netherlands, Poland and Danzig, and Sweden supplied virtually all of the balance.

Imported peat was classified according to use into two grades (1) Poultry and stable and (2) fertilizer. No data were available on ultimate uses but, presumably, poultry and stable grade was used as animal and poultry litter and fertilizer grade was used for various types of soil improvement. Of the total imported, 98.5 percent was fertilizer grade which entered the United States duty free. A duty of $0.25 per long ton was levied upon peat classified poultry and stable grade.

The bulk of the shipments entered the United States through the Washington, Vermont, St. Lawrence, Michigan, Buffalo, and Dakota customs districts. Most of this peat was fertilizer grade, produced in Canada. West German shipments passed principally through eastern and gulf coast ports.

Tables 7, 8, and 9 show quantities and values for the different grades of peat imported, by country and customs district.

Table 7.—Peat moss imported for consumption in the United States, by kind and by country

Country	Poultry and stable grade		Fertilizer grade		Total	
	Short tons	Value	Short tons	Value	Short tons	Value
1963:						
North America:						
Canada	4,135	$248,500	206,649	$10,038,335	210,784	$10,286,835
Guatemala	7	358			7	358
Mexico	40	4,239			40	4,239
Total	4,182	253,097	206,649	10,038,335	210,831	10,291,432
Europe:						
Denmark	17	767	212	9,736	229	10,503
Finland			123	5,240	123	5,240
France			7	368	7	368
Germany, West	1,273	55,440	34,099	1,411,885	35,372	1,467,325
Ireland	62	2,200	2,293	88,993	2,355	91,193
Netherlands	84	3,959	1,558	57,993	1,642	61,952
Poland and Danzig			6,786	247,017	6,786	247,017
Sweden			3,677	171,173	3,677	171,173
Portugal			124	2,000	124	2,000
United Kingdom			130	5,345	130	5,345
Total	1,436	62,366	49,009	1,999,750	50,445	2,062,116
Asia: Japan	4	2,085	51	1,924	55	4,009
Grand total	5,622	317,548	255,709	12,040,009	261,331	12,357,557
1964:						
North America:						
Canada	3,764	208,080	220,516	10,360,374	224,280	10,568,454
Mexico	25	4,345	257	11,800	282	16,145
Total	3,789	212,425	220,773	10,372,174	224,562	10,584,599
South America: Colombia			6	267	6	267
Europe:						
Belgium-Luxembourg	1	135	44	1,890	45	2,025
Denmark			25	876	25	876
Finland			124	3,332	124	3,332
France			181	4,832	181	4,832
Germany, West	993	38,706	32,000	1,178,560	32,993	1,217,266
Ireland			2,677	94,614	2,677	94,614
Netherlands	45	1,773	732	23,383	777	25,156
Poland and Danzig			7,428	242,177	7,428	242,177
Sweden			1,455	67,462	1,455	67,462
United Kingdom			140	7,827	140	7,827
Total	1,039	40,614	44,806	1,624,953	45,845	1,665,567
Asia: Japan	6	2,575			6	2,575
Grand total	4,834	255,614	265,585	11,997,394	270,419	12,253,008
1965:						
North America:						
Canada	3,101	175,628	229,639	10,289,260	232,740	10,464,888
Mexico	37	8,187	44	2,170	81	10,357
Total	3,138	183,815	229,683	10,291,430	232,821	10,475,245
South America:						
Argentina	13	1,980	56	4,900	69	6,880
Brazil			54	4,500	54	4,500
Peru			110	11,200	110	11,200
Total	13	1,980	220	20,600	233	22,580
Europe:						
Finland			100	3,380	100	3,380
France			45	1,180	45	1,180
Germany:						
East			44	1,635	44	1,635
West	679	26,439	28,331	979,804	29,010	1,006,243
Ireland	140	4,650	3,323	102,080	3,463	106,730
Netherlands			1,072	56,974	1,072	56,974
Poland and Danzig			7,121	226,701	7,121	226,701
Sweden			1,228	54,543	1,228	54,543
United Kingdom	20	700	299	9,284	319	9,984
Total	839	31,789	41,563	1,435,581	42,402	1,467,370
Asia: Japan	6	2,525			6	2,525
Grand total	3,996	220,109	271,466	11,747,611	275,462	11,967,720

Table 8.—Peat moss imported for consumption in the United States in 1965, by kind and by customs district

Customs district	Poultry and stable grade		Fertilizer grade		Total	
	Short tons	Value	Short tons	Value	Short tons	Value
Buffalo	12	$473	32,103	$1,347,780	32,115	$1,348,253
Chicago			298	14,146	298	14,146
Dakota	1,725	111,135	18,660	831,028	20,385	942,163
Duluth and Superior			148	9,475	148	9,475
Florida			7,726	246,873	7,726	246,873
Galveston	45	2,010	1,456	54,542	1,501	56,552
Georgia			455	14,331	455	14,331
Hawaii	29	3,422	29	1,630	58	5,052
Laredo	37	8,187	31	899	68	9,086
Los Angeles	56	2,270	1,528	58,716	1,584	60,986
Maine and New Hampshire			848	37,769	848	37,769
Maryland	64	3,877	3,319	118,315	3,383	122,192
Massachusetts			1,736	53,026	1,736	53,026
Michigan	280	13,540	32,223	1,319,203	32,503	1,332,743
Mobile			3,096	108,258	3,096	108,258
Montana and Idaho			3,772	160,248	3,772	160,248
New Orleans	293	11,109	4,479	150,735	4,772	161,844
New York	202	5,590	7,450	279,297	7,652	284,887
North Carolina			188	4,681	188	4,681
Ohio			429	13,193	429	13,193
Oregon			92	2,596	92	2,596
Philadelphia	152	5,739	5,324	206,936	5,476	212,675
Puerto Rico	13	2,220	11	589	24	2,809
Rhode Island			226	14,445	226	14,445
Rochester			170	7,091	170	7,091
St. Lawrence	371	15,127	43,861	1,589,334	44,232	1,604,461
San Francisco			511	14,393	511	14,393
South Carolina			714	27,482	714	27,482
Vermont	361	14,859	48,282	1,846,945	48,643	1,861,804
Virginia	27	954	3,149	99,867	3,176	100,821
Washington	329	19,597	49,083	3,111,858	49,412	3,131,455
Wisconsin			69	1,930	69	1,930
Total	3,996	220,109	271,466	11,747,611	275,462	11,967,720

Table 9.—Peat moss imported from Canada and West Germany for consumption in the United States in 1965, by kind and by customs district

Customs district	Canada				West Germany			
	Poultry and stable grade		Fertilizer grade		Poultry and stable grade		Fertilizer grade	
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value
Buffalo	12	$473	32,057	$1,345,766				
Chicago			203	11,278			95	$2,868
Dakota	1,725	111,135	18,660	831,028				
Duluth and Superior			148	9,475				
Florida							6,682	214,545
Galveston					45	$2,010	1,004	37,982
Georgia							419	13,104
Hawaii	23	897	29	1,630				
Laredo							31	899
Los Angeles							1,438	55,037
Maine and New Hampshire			848	37,769				
Maryland					50	1,897	1,922	71,061
Massachusetts			32	1,527			471	16,368
Michigan	280	13,540	32,223	1,319,203				
Mobile							2,737	85,664
Montana and Idaho			3,754	159,672				
New Orleans			16	731	274	10,409	2,935	95,438
New York			55	2,352	118	3,210	3,956	160,078
North Carolina							128	3,470
Ohio							429	13,193
Oregon							92	2,596
Philadelphia					152	5,739	3,226	117,427
Puerto Rico					13	2,220	11	589
Rhode Island			226	14,445				
Rochester			170	7,091				
St. Lawrence	371	15,127	43,861	1,589,334				
San Francisco							491	13,603
South Carolina							714	27,482
Vermont	361	14,859	48,282	1,846,945				
Virginia			18	750	27	954	1,526	47,650
Washington	329	19,597	49,057	3,110,264				
Wisconsin							24	750
Total	3,101	175,628	229,639	10,289,260	679	26,439	28,331	979,804

TECHNOLOGY

A recent Soviet patent [2] describes a method for obtaining organic acids from peat. In this process, acids are prepared by subjecting peat to alkaline hydrolysis and oxidizing the aqueous-alkaline peat suspension with atmospheric oxygen by heat and pressure.

A Finnish patent [3] details the use of peat for the manufacture of fireproof fiberboard. This method consists, essentially, of treating an unnamed fibrous material and peat, separately, with fireproofing agents and neutralizing the peat before it is mixed with the fibers and cement. This procedure prevents impairment of the binding properties of the cement by the acid condition of the peat. The peat is foamed, also, to lower its bulk density and thermal condition.

Studies in the U.S.S.R. have resulted in the development of a new method [4] for determining the water content of peat. The process involves the use of a spectrometer with an autodyne generator which determines water content to an accuracy of 2 percent. Individual calibrating curves had to be prepared for different types of peat; thus, the method was not suitable for peat with a water content of less than 20 percent.

In a Soviet investigation of the qualita-

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[2] Proskuryakov, V. A., A. G. Rembashevskii, E. F. Mayakova, E. A. Antropyanskaya, and N. I. Kazantsev. (Organic Acids From Peat.) U.S.S.R. Pat. 166,669, Dec. 1, 1964; Chem. Abs., v. 62, No. 8, Apr. 12, 1965, col. 8898d.

[3] Rannila, T. V. (Fireproof Fiberboard from Fibrous Material and Peat.) Finnish Pat. 31,193, Jan. 31, 1961; Chem. Abs., v. 62, No. 10, May 10, 1965, col. 12016a.

[4] Volarovich, M. P., and A. I. Shchukin. Determination of the Water Content of Peat by Nuclear Magnetic Resonance. Kolloidnyi Zhur., v. 27, No. 3, 1965; Chem. Abs., v. 62, No. 5, Aug. 30, 1965, col. 5413f.

tive and quantitative compositions of 21 types of peat by use of an electron microscope[5], it was found that peat contains a large number of unique cell forms that vary in quantity in different types of peat. Lowland peat had the maximum number of microflora; upland moor peat had the next largest number; and intermediate types had the least. It was determined also that peats with a high degree of decomposition and a considerable amount of humic substances had considerably less microflora than peats of a medium and low degree of decomposition.

Another study in the U.S.S.R.[6] established that the pH of water extracted from peat changes with time. It was found that the pH increases by an amount equal to one unit in the first 3 to 4 days of storage of the extract in open bottles. This phenomenon is believed caused by a redox reaction and microbiological processes.

Another Soviet report[7] presents data on the chemical composition, biological activity, and the effectiveness of peat in soils. In large-scale field experiments in which peat was used alone, mixed with animal manure, and mixed with calcium hydroxide, the introduction of peat and peat mixtures increased crop yield of the various plants in all instances. However, the effectiveness of peat as a fertilizer increased with its degree of decomposition. Thus, it was concluded that the lower layers of peat deposits are more suitable than the upper layers for improving the nutrient and physical properties of podzol soils. The addition of calcium hydroxide increased the biological activity of peat considerably.

WORLD REVIEW

Total production of peat throughout the world in 1965 was estimated at 205 million tons, an increase of 10 percent over estimated production in 1964. Virtually all of the increase was the result of a larger output of agricultural peat in the U.S.S.R.

The U.S.S.R. had the largest production with an estimated output of 196 million tons, 96 percent of the world total. Peat has long been used as a major source of energy in some areas of the Soviet Union, and it is estimated that about one-third of the output in 1965 was used for fuel. Most of the fuel peat was used for generating electric power, but substantial quantities were converted into briquets which were used for domestic and industrial heating. The major part of the Soviet production, however, was used in agriculture for soil improvement. As in the United States, peat is added directly to the soil for various soil-improvement purposes in the U.S.S.R. The Soviets, however, also use large quantities of peat for producing peat-mineral-ammonia fertilizers that are used extensively in lieu of regular animal and chemical fertilizers.

Ireland, with 4.2 million tons of output, ranked second in world production. Although production was small when compared with that of the Soviet Union, peat supplied a substantial part of Ireland's total energy requirement and was used not only for cooking and heating, but also for generating electric power. Total electric generating capacity in Ireland in 1965 was 1,009.5 megawatts, of which 36 percent was at five generating plants fired with peat. An additional 40-megawatt, peat-fired plant is now under construction. Ireland's output of agricultural peat was small and most was exported.

West Germany, the third leading producer, had an estimated output of 1.7 million tons. Unlike Ireland, the major part of the peat produced in Germany was used in agriculture. However, substantial amounts are used also for domestic and industrial heating in producing areas. About 2 percent of West Germany's production of agricultural peat was exported to the United States.

The United States, East Germany, the Netherlands, Sweden, Canada, Norway, the Republic of Korea, and Poland followed in output in the order named. Each country produced more than 100,000 tons. The United States, ranking fourth in world output, had 0.3 percent of the total production.

Table 10 shows world production by country.

[5] Valorovich, M. P., and V. P. Tropin. Electron Microscope Study of Microflora in Various Types of Peat. Tr. Kalininsk. Torf. Inst., No. 13, 1963, pp. 5-19, Chem. Abs., v. 62, No. 6, Mar. 15, 1965, col. 6308d.

[6] Lishtvan, I. I., A. M. Mamtsis, and Petrukhin. Studying the Acidity of Peaty-Bog Soils. Pochvovedenie, No. 5, 1965, pp. 47-49; Chem. Abs., v. 63, No. 3, Aug. 2, 1965, col. 3568a.

[7] Grishkun, E. V., and V. A. Usynina. Chemical Composition and Biological Activity of Peat. Sb. Tr. Povolzhsk. Lesotekhn. Inst., No. 55, 1961, pp. 227-229, Chem. Abs., v. 63, No. 2, July 19, 1965, col. 2350b.

Table 10.—World production of peat by country

(Thousand short tons)

Country [1]	1961	1962	1963	1964	1965 [p]
Argentina, fuel	[r] 1	[r] 2	[r] 12	[r] 4	[e] 6
Austria, fuel [e]	[r] 6	[r] 6	[r] 6	6	6
Canada, agricultural use [2]	224	238	244	[r] 255	267
Denmark, fuel	125	67	55	40	22
Finland:					
Agricultural use	[r] 1	4	[r] 3	4	4
Fuel	128	[r] 68	[r] 88	[r] 79	72
France:					
Agricultural use	33	31	35	[e] 40	[e] 40
Fuel	(3)	[e] 3	[e] 3	[e] 3	[e] 3
Germany:					
East [e]	550	550	550	550	550
West:					
Agricultural use	830	911	884	[r] 1,085	[e] 1,113
Fuel	672	776	837	[r] 773	[e] 628
Hungary, argicultural use [e]	65	65	65	70	70
Ireland:					
Agricultural use	21	24	[r] 28	21	[e] 23
Fuel	3,912	[r] 4,539	[r] 3,918	[r] 5,101	[e] 4,157
Israel, agricultural use [e]	[r] 9	[r] 11	[r] 13	[r] 15	17
Japan [e]	80	80	80	75	75
Korea, South, agricultural use	45	137	128	[r] 127	[e] 127
Netherlands [e]	500	500	440	440	440
Norway:					
Agricultural use	50	40	40	46	50
Fuel	180	161	115	115	[e] 116
Poland, fuel	83	73	112	[e] 110	[e] 110
Sweden:					
Agricultural use	[e] 70	61	[e] [r] 52	[e] 70	[e] 77
Fuel	252	169	[r] 234	[e] 275	[e] 243
U.S.S.R.:					
Agricultural use [e]	100,000	100,000	100,000	110,000	130,000
Fuel	57,300	38,300	[r] 64,500	[r] 65,600	[e] 66,100
United States, agricultural use	531	572	579	649	604
World total [e] [1] [4]	[r] 165,700	[r] 147,400	[r] 173,000	[r] 185,600	204,900
Fuel peat (included in world total) [e] [4]	[r] 63,300	[r] 44,800	[r] 70,400	[r] 72,700	72,000

[e] Estimate. [p] Preliminary. [r] Revised.

[1] Data do not add exactly tc totals shown because of rounding where estimated figures are included in the detail.

[2] In addition, Canada produced a negligible quantity of fuel peat.

[3] Less than 500 tons.

[4] In addition, Iceland, Italy, and Spain produced a negligible quantity of fuel peat

Carbon Black

By William B. Harper [1] and Carl W. Kelley [2]

GENERAL SUMMARY

Domestic sales of carbon black sustained the upward movement for the 4th consecutive year, reflecting the increased sales of motor vehicles during the same period. Sales of carbon black in the domestic market topped 2 billion pounds for the first time during 1965 and have more than doubled the output of 20 years earlier.

By far the largest user of carbon black is the rubber industry. That use accounted for more than 94 percent of the carbon black consumption with the bulk of it being used in tire casings and tubes. Thus demand for carbon black is naturally sensitive to trends in the sales of passenger cars and other motor vehicles. Manufacturers of inks, paints, plastics, paper chemicals, and food are also important users of carbon black.

The other major outlet for carbon black has been the foreign market. However, chemical manufacturers abroad have been switching from coal to a petroleum base as a source for its raw materials. This has made available the heavy aromatic oils used to make carbon black. Tire and rubber goods manufacturers in foreign countries, therefore, no longer find it necessary to import as much carbon black from the United States. Exports, which as recently as 5 years ago exceeded 543 million pounds, shrunk to 274.6 million by the end of 1965, and there is little reason to expect any reversal in the diminishing of foreign trade in the foreseeable future.

Increased production of furnace blacks more than offset declines in the output of channel black. Production of the latter dropped 12 percent in 1965 to about 148 million pounds or about the same level as the late twenties.

Prices of the natural gas used as feedstock averaged 14.59 cents per thousand cubic feet in 1965, which is 9.37 percent higher than in 1964.

[1] Minerals specialist, Division of Petroleum.
[2] Chemist, Division of Petroleum.

Table 1.—Salient statistics of carbon black produced from natural gas and liquid hydrocarbons in the United States, 1961–65

(Thousand pounds)

	1961	1962	1963	1964	1965
Production:					
Channel process	262,507	207,438	179,012	169,919	147,909
Furnace process	1,717,045	1,849,026	1,879,904	2,053,297	2,205,867
Total	1,979,552	2,056,464	2,058,916	2,223,216	2,353,776
Shipments:					
Domestic sales	1,460,005	1,639,897	1,727,420	1,911,494	2,072,500
Exports	522,331	442,437	370,928	333,907	274,608
Total	1,982,336	2,082,334	2,098,348	2,245,401	2,347,108
Losses	2,299	370	592	910	135
Stocks of producers, December 31	287,899	r 293,434	r 254,216	r 231,171	237,704
Value:					
Production thousand dollars	144,421	145,256	147,824	155,761	166,111
Average per pound cents	7.30	7.06	7.18	7.01	7.06

r Revised. No attempt has been made to revise stocks for previous years, since data are not available.

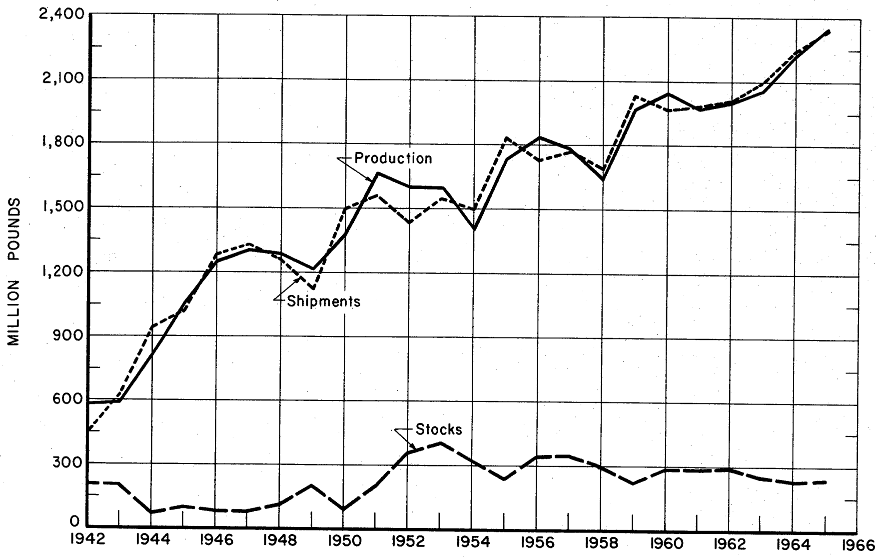


Figure 1.—Production, stocks, and shipments of carbon black 1942–65

SCOPE OF REPORT

Monthly figures, which are based on reports prepared by the National Gas Products Association, are readjusted to agree with the annual reports received by the Bureau of Mines. These annual reports are submitted to the Bureau on a voluntary basis by operators of all commercial plants in the United States. Data on imports and exports are compiled by the Foreign Trade Division of the Bureau of Census, U.S. Department of Commerce.

Data are obtained on both furnace and channel blacks and furnace blacks are reported in eight grades: Semireinforcing furnace (SRF); high modulus furnace (HMF); general-purpose furnace (GPF); fast extrusion furnace (FEF); high-abrasion furnace (HAF); superabrasion furnace (SAF); intermediate-abrasion furnace (ISAF); and the thermal. Production and shipments data are given by months and types in table 3.

PRODUCTION AND CAPACITY

Production by States.—Carbon black production in 1965 rose to nearly 2,355 million pounds which was 6 perecnt more than that of 1964. Texas, which accounts for about one half of the production, increased its output nominally—about 1 percent, but Louisiana, which produces about a third of the carbon black, increased its production in 1965 about 13 percent, thus narrowing the gap with Texas. As compared with 5 years ago, Louisiana production has increased 40.8 percent; Texas production for the same period increased 9.5 percent. California, which ranks third in terms of production, increased its output to about 118 million pounds between 1964 and 1965, or 11.5 percent. These three States accounted for nearly 90 percent of all the carbon black produced while the remaining 10 percent was produced by plants in Arkansas, Kansas, New Mexico, and Oklahoma.

Production by Grades and Types.—Production of carbon blacks reached a new high of 2,353.7 million pounds, a gain of 6 percent. All but 6 percent of the carbon black produced is obtained by means of the furnace process. There are seven major grades produced by the furnace process but the high-abrasion-furnace (HAF) and the intermediate-abrasion-furnace (ISAF) grades account for almost half of the total furnace black production. Conversely, channel black output dropped 22 million pounds below the volume produced in 1965 as more channel black plants ceased operations.

Number and Capacity of Plants.—The closing of three channel black plants reduced the total plants to 34, so that at the end of the year there were only 29 furnace black and 5 channel black plants in operation. Two of the closed channel plants had been operating in Texas and the only channel black plant in Louisiana closed its doors. Despite these closings, however, capacity in 1965 rose sharply. Overall capacity at the end of 1965, was 8,040,300 pounds per day, a year-to-year increase of 771,000 pounds, or 10.6 percent. Louisiana accounted for nearly 8 out of every 10 pounds of the expanded capacity as shown in table 4. Texas, with 18 plants, continues to be the largest producer of carbon black with 50.4 percent of capacity. Louisiana with eight furnace black plants, increased its relative position from 29 percent to 34 percent.

Materials Used and Yields.—The shutdown of three channel plants during 1965 is also having an impact on the raw materials mix for carbon black manufacture, namely natural gas and liquid hydrocarbons. Consumption of natural gas dropped from nearly 106.8 million cubic feet in 1964 to 93.3 million in 1965, or 12.6 percent. A total of 593,225 thousand pounds of carbon black were produced from natural gas in 1965 and furnace blacks accounted for 470,387 thousand pounds or 79 percent. At furnace black plants 382,566 thousand gallons of liquid hydrocarbons were used to produce 1,735,480 thousand pounds of carbon black, a yield of 4.5 pounds per gallon. The proportion of furnace black output derived from liquid hydrocarbons which was sustained at 81 percent during the 1961–64 period, declined to 78.7 percent in 1965.

Table 2.—Carbon black produced from natural gas and liquid hydrocarbons in the United States

(Thousand pounds)

State	1961	1962	1963	1964	1965	Change from 1964 (percent)
Louisiana	[1] 582,833	[1] 608,499	649,170	725,669	820,552	+13
Texas	[1] 1,070,843	[1] 1,106,874	1,105,189	1,165,593	1,172,693	+1
Other States	325,876	341,091	304,557	331,954	360,531	+9
Total	1,979,552	2,056,464	2,058,916	2,223,216	2,353,776	+6

[1] Small quantity of channel black produced in Louisiana included in Texas to avoid disclosure of confidential data.

Table 3.—Production and shipments of carbon black in the United States in 1965, by months and grades

(Thousand pounds)

	Furnace									Channel	Total
	SRF [1]	HMF [2]	GPF [3]	FEF [4]	HAF [5]	SAF [6]	ISAF [7]	Thermal	Total		
PRODUCTION [8]											
January	26,917	2,055	18,555	20,455	46,777	1,219	44,278	22,462	182,718	11,374	194,092
February	23,008	2,525	14,800	20,374	39,696	1,527	43,374	20,911	166,215	11,413	177,628
March	28,299	1,362	18,290	23,868	49,331	3,005	46,119	24,640	194,914	13,031	207,945
April	27,872	3,113	15,785	26,231	48,974	1,903	44,089	22,891	190,858	12,698	203,556
May	30,332	4,507	13,752	25,221	50,716	1,672	43,379	24,559	194,138	12,453	206,591
June	27,036	2,793	15,358	21,214	44,659	1,828	39,361	20,773	173,022	12,374	185,396
July	24,914	2,328	17,642	17,866	50,539	438	38,168	22,753	174,648	12,986	187,634
August	23,715	1,293	14,503	18,922	43,930	1,347	41,796	23,029	168,535	11,618	180,153
September	22,497	2,087	18,084	19,956	44,150	891	35,794	21,275	164,734	11,921	176,655
October	24,771	3,324	19,375	23,230	55,672	2,066	42,318	24,710	195,466	12,870	208,336
November	26,092	3,578	15,231	25,723	59,874	1,117	40,905	23,486	196,006	12,455	208,461
December	28,149	3,132	17,019	27,848	60,779	1,088	44,750	21,848	204,613	12,716	217,329
Total	313,602	32,097	198,394	270,908	595,097	18,101	504,331	273,337	2,205,867	147,909	2,353,776
SHIPMENTS (INCLUDING EXPORTS) [9]											
January	23,864	1,713	16,264	19,169	42,598	1,385	43,156	18,682	166,831	7,984	174,815
February	25,947	1,577	16,139	23,282	42,417	1,554	41,737	20,284	172,937	9,261	182,198
March	29,218	2,863	18,798	25,675	51,760	2,474	48,324	24,676	203,788	16,988	220,776
April	27,944	4,371	16,296	24,165	47,799	1,315	43,786	21,822	187,498	16,054	203,552
May	26,433	3,849	13,090	21,553	46,949	2,321	41,288	21,586	177,069	11,887	188,956
June	23,620	2,318	16,059	20,665	46,648	1,023	38,762	22,381	171,476	13,431	184,907
July	24,220	1,637	14,375	19,441	47,381	1,378	38,169	18,496	165,097	11,132	176,229
August	26,269	2,202	18,291	19,173	49,235	1,191	38,753	19,728	174,842	11,501	186,343
September	23,631	2,047	17,822	22,038	49,242	1,088	39,848	22,301	178,017	11,422	189,439
October	28,547	2,243	18,027	25,071	58,425	1,695	45,120	23,247	202,375	12,908	215,283
November	29,964	3,558	18,321	25,850	56,002	1,874	42,635	19,978	198,182	11,770	209,952
December	27,785	4,011	17,305	24,192	57,650	1,096	46,947	22,632	201,618	13,175	214,793
Total	317,442	32,389	200,787	270,274	596,106	18,394	508,525	255,813	2,199,730	147,513	2,347,243

[1] Semireinforcing furnace.
[2] High-modulus furnace.
[3] General-purpose furnace.
[4] Fast-extrusion furnace.
[5] High-abrasion furnace.
[6] Superabrasion furnace.
[7] Intermediate-abrasion furnace.
[8] Compiled from reports of a consulting engineer of the carbon black industry and of producing companies not included in his figures. Figures adjusted to agree with annual reports of individual producers.
[9] Includes losses.

Table 4.—Number and capacity of carbon black plants operated in the United States, 1964–65

State	County or parish	Number of plants 1964 Channel	Number of plants 1964 Furnace	Number of plants 1965 Channel	Number of plants 1965 Furnace	Total daily capacity (pounds) 1964	Total daily capacity (pounds) 1965
Texas	Aransas	1	1	--	1	3,945,300	4,060,300
	Carson	1	--	1	--		
	Ector	1	--	1	--		
	Gaines	1	--	1	--		
	Gray	1	1	--	1		
	Harris	--	1	--	1		
	Howard	--	2	--	2		
	Hutchinson	1	4	1	4		
	Montgomery	--	1	--	1		
	Moore	--	1	--	1		
	Orange	--	1	--	1		
	Terry	--	1	--	1		
	Wheeler	--	1	--	1		
Total Texas		6	14	4	14	3,945,300	4,060,300
Louisiana	Avoyelles	--	1	--	1	2,130,000	2,733,000
	Calcasieu	--	1	--	1		
	Evangeline	--	1	--	1		
	Ouachita	--	2	--	2		
	St. Mary	1	3	--	3		
Total Louisiana		1	8	--	8	2,130,000	2,733,000
Arkansas	Union	--	1	--	1	1,194,000	1,247,000
California	Contra Costa	--	1	--	1		
	Kern	--	2	--	2		
Kansas	Grant	--	1	--	1		
New Mexico	Lea	1	1	1	1		
Oklahoma	Kay	--	1	--	1		
		1	7	1	7	1,194,000	1,247,000
Total United States		8	29	5	29	7,269,300	8,040,300

Table 5.—Carbon black and the feedstocks used in its production, 1964–65, by States

	Louisiana	Texas	Other States[1]	Total
1964:				
Carbon black production:				
Total ... thousand pounds	725,669	1,165,593	331,954	2,223,216
Value ... thousand dollars	47,908	86,494	21,359	155,761
Average value ... cents per pound	6.60	7.42	6.43	7.01
Natural gas used:				
Total ... million cubic feet	21,642	65,438	19,679	106,759
Value ... thousand dollars	3,314	7,948	2,980	14,242
Average value ... cents per thousand cubic feet	15.31	12.15	15.14	13.34
Carbon black produced ... thousand pounds	298,750	188,416	86,832	573,998
Liquid hydrocarbons used:				
Total ... thousand gallons	102,153	206,517	46,204	354,874
Value ... thousand dollars	7,328	14,003	2,773	24,104
Average value ... cents per gallon	7.17	6.78	6.00	6.79
Carbon black produced ... thousand pounds	426,919	977,177	245,122	1,649,218
1965:				
Carbon black production:				
Total ... thousand pounds	820,552	1,172,693	360,531	2,353,776
Value ... thousand dollars	55,253	87,495	23,363	166,111
Average value ... cents per pound	6.73	7.46	6.48	7.06
Natural gas used:				
Total ... million cubic feet	22,278	50,906	20,112	93,296
Value ... thousand dollars	3,541	7,005	3,070	13,616
Average value ... cents per thousand cubic feet	15.89	13.76	15.26	14.59
Carbon black produced ... thousand pounds	334,782	175,103	83,340	593,225
Liquid hydrocarbons used:				
Total ... thousand gallons	117,050	218,917	53,206	389,173
Value ... thousand dollars	8,391	15,009	3,309	26,709
Average value ... cents per gallon	7.17	6.86	6.22	6.86
Carbon black produced ... thousand pounds	485,770	997,590	277,191	1,760,551

[1] Arkansas, California, Kansas, New Mexico, and Oklahoma.

Table 6.—Natural gas and liquid hydrocarbons used in manufacturing carbon black in the United States and average yield, 1961–65

	1961	1962	1963	1964	1965
Natural gas used ... million cubic feet	161,377	133,302	117,378	106,759	93,296
Average yield of carbon black per thousand cubic feet ... pounds	3.71	4.03	4.63	5.38	6.36
Average value of natural gas used per thousand cubic feet ... cents	10.37	11.25	12.70	13.34	14.59
Liquid hydrocarbons used ... thousand gallons	307,637	330,399	333,103	354,874	389,173
Average yield of carbon black per gallon ... pounds	4.49	4.60	4.55	4.65	4.52
Average value of liquid hydrocarbons used per gallon ... cents	7.02	6.71	6.66	6.79	6.86
Number of producers reporting	11	10	9	9	9
Number of plants	44	41	39	37	34

CONSUMPTION AND USES

Reflecting a rising demand for carbon black by the rubber industry, carbon black shipments have been increasing over the past 4 years. An increase of 161 million pounds in domestic shipments of blacks more than offset a decline of 59 million pounds in exports; thus, the increase was reduced to 4.5 percent. Shipments during the year totaled 2,347 million pounds and establisehd a new high.

The rubber industry, which uses about 90 percent of all carbon black for motor vehicle tires and 4 percent for other rubber goods, has been experiencing a growing market for its products during the past 4 years. Sales of motor vehicles have been rising during these years, and since each new vehicle is equipped originally with at least four new tires, demand for tires and other rubber products has been very strong. In addition, there is the replacement tire market which has expanded with the growth in the motor vehicle population. In the aggregate, total shipments of passenger car tires for all purposes in 1965 were 148.6 million compared with 116.8 million in 1962, or a difference of 27 percent.

The tread of a modern passenger car tire contains about 30 percent by weight of reinforcing black. In addition, the use of carbon black includes the tire carcass, sidewall, and the inner tubes. To meet the varied requirements for each application, 15 grades of carbon black are produced. Major grades for the furnace blacks are shown in table 3.

Carbon black was originally produced as a pigment for the printing-ink industry and, although the volumes of carbon black used by the rubber industry far surpasses every other usage, the printing-ink industry is the second most important customer. Consumption of carbon black for this purpose totaled 54.3 million pounds in 1965, or an increase of nearly 19 percent over that of 1964. Two major grades of carbon black are produced for the manufacturers of printing inks. "Short-ink" used in the manufacture of inks for printing newspapers is made from oil-furnace blacks. "Long-ink blacks" used in lithographic or halftone printing inks, require a high-quality specific type of product available with the channel process.

The use of carbon black by the plastics industry has also been increasing rapidly. It was found that a 2-percent addition of carbon black to the polyethylene used in cable coating provided resistance to embrittlement caused by exposure to sunlight, and this faculty has been recognized in development of other plastics. Carbon black is also used extensively in the manufacture of specialty papers such as carbon papers. Carbon black is also used as a tinting agent, as an anticaking agent in cements and fertilizers, as a pigment in the confectionery and cosmetic industries, and as an important ingredient in liquid-oxygen explosives.

Table 7.—Sales of carbon black for domestic consumption in the United States, 1961–65, by uses

(Thousand pounds)

Uses	1961	1962	1963	1964	1965	Change from 1964 (percent)
Chemical and food	(1)	6,776	7,288	10,259	8,447	−18
Ink	42,987	41,162	46,471	45,688	54,333	+19
Paint	15,267	15,766	13,008	17,982	10,896	−39
Paper	4,947	4,620	8,721	8,004	7,649	−4
Plastics	[1] 8,248	7,720	8,539	12,281	20,183	+64
Rubber	1,382,893	1,551,204	1,629,905	r 1,789,432	1,945,459	+9
Miscellaneous	5,663	12,649	13,488	r 27,848	25,533	−8
Total	1,460,005	1,639,897	1,727,420	1,911,494	2,072,500	+8

r Revised.
[1] Chemical and food combined with plastics in 1961 to avoid disclosure of individual company data.

STOCKS

Total stocks were higher in 1965 largely because of a buildup in inventories of the thermal blacks. Other comparisons for a 6-year period are given in table 8.

Table 8.—Producers' stocks of channel- and furnace-type blacks in the United States, December 31, 1960–65

(Thousand pounds)

Year	Furnace										
	SRF [1]	HMF [1]	GPF [1]	FEF [1]	HAF [1]	SAF [1]	ISAF [1]	Thermal	Total	Channel	Total
1960 [2]	43,402	11,040	8,827	23,420	66,325	4,437	39,075	23,032	219,558	73,424	292,982
1961	41,171	7,694	9,055	22,069	69,799	8,510	62,728	16,229	237,255	50,644	287,899
1962 [3]	38,509	12,046	24,619	28,507	68,470	8,939	58,471	13,575	253,136	40,298	293,434
1963 [3]	31,101	7,927	21,129	23,137	61,473	4,115	50,391	6,338	205,611	48,605	254,216
1964	39,200	9,234	26,166	20,641	46,230	r 5,134	36,062	5,529	r 188,196	42,975	r 231,171
1965	34,828	7,291	20,385	23,275	48,644	4,277	35,506	22,835	197,041	40,663	237,704

[1] For explanation, see footnotes to table 3.
[2] Reclassification of grades.
[3] Revised. No attempt has been made to revise stocks for previous years since data are not available.

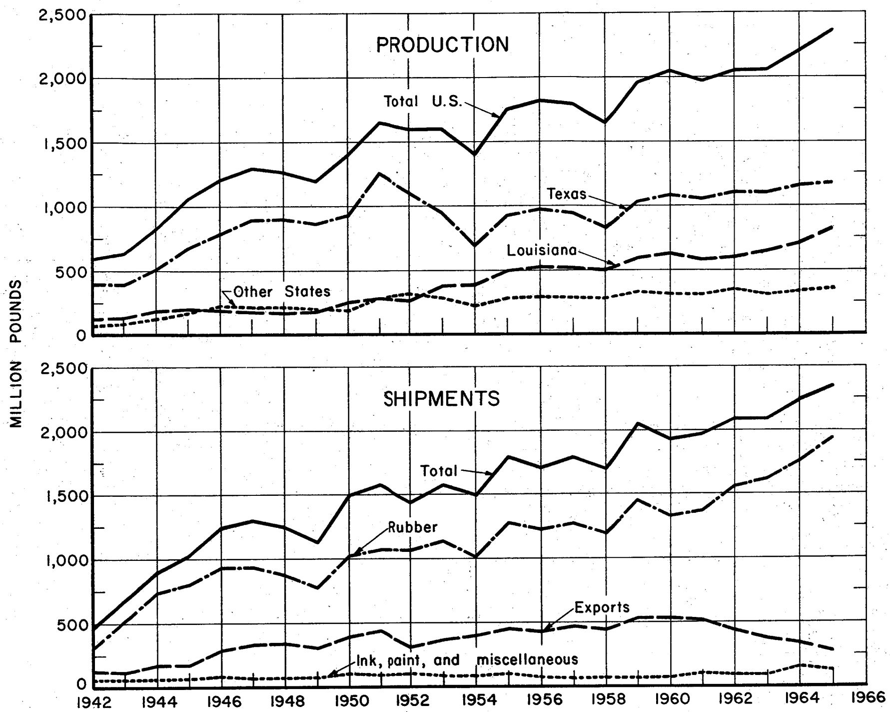


Figure 2.—Production, by State, and shipments, by use, and exports 1942–65

FOREIGN TRADE

Exports of carbon black in 1965 aggregated 274.6 million pounds. This volume, 17.7 percent below that of the preceding year, reflects the downtrend in exports. Foreign sales reached a peak of 543 million in 1960 and have declined every year since. Compared with exports in 1960, exports from the United States in 1965 had decreased 49 percent.

Part of this decrease, particularly in Europe, reflects the transition from coal to petroleum as a chemical raw material. Also, the expansion in the refining capacity abroad has increased the availability of aromatic and residual fuel oils suitable for carbon black manufacture.

In the Western Hemisphere, exports to Canada and Mexico have been cut sharply. Likewise, in exports to Europe the most significant reductions were in shipments to France, Italy, the United Kingdom, and the Soviet Union, but as shown in table 10, exports had declined in all but 5 of the 21 countries in Europe which buy carbon black in the United States. Part of this drop in our foreign markets becomes more understandable when the growth in foreign production is examined. Germany has more than doubled its output of carbon black during the past decade. Japan which produced about 25 million pounds of carbon black in 1956, has increased its output nearly 10-fold during the same period. In the short span since 1960, carbon black production in Italy climbed rapidly from 17.6 million pounds to nearly 148 million pounds by 1964. Other comparisons are given in table 11.

About 6 million pounds of acetylene carbon black are imported and virtually all of it is from Canada. A small amount of other specialty blacks, such as bone black and lampblack, are imported from West Germany and Belgium-Luxembourg.

Table 9.—U.S. exports of carbon black, 1965, by months

(Thousand pounds)

Month	Channel	Furnace	Total
January	806	6,358	7,164
February	239	5,688	5,927
March	4,234	24,601	28,835
April	9,864	28,858	38,722
May	5,853	22,063	27,916
June	6,944	24,040	30,984
July	5,829	17,798	23,627
August	4,140	17,779	21,919
September	4,320	14,155	18,475
October	5,577	19,826	25,403
November	4,010	21,764	25,774
December	3,692	16,170	19,862
Total 1965	55,508	219,100	274,608
Total 1964	75,378	258,529	333,907

PROCESSES

Characteristics.—Carbon black is a semigraphitic form of minute particles of carbon prepared in a fine state of subdivision by the partial combustion of hydrocarbons. Particle size is related to the uses of carbon black and sizes range from the very fine channel blacks with particle diameters of 5 to 10 millimicrons, to the very large particle blacks with diameters ranging from 150 to 200 and from 250 to 500 millimicrons which are obtained by means of the thermal process.

The hydrocarbons used to obtain these blacks may be either gaseous or liquid products such as natural gas, other gas, or oil fractions from refinery streams.

Until 1945 carbon black was made by the channel, gas-furnace, and thermal processes; and the principal raw material was natural gas, with occasional enrichment of distillate oils. Since the introduction of the oil-furnace process in 1945, three-fourths of the carbon black is made from liquid hydrocarbons. However, large quantities of natural gas are still used.

Thermal black particles are approximately 17 to 20 times larger in size than those made by the channel process. The gas-furnace process, introduced in 1922, resulted from the desire to improve recovery and produce blacks with reinforcing ability intermediate between the thermal and channel blacks. Average yield is four times that of the channel process. Although gas-furnace black does not provide sufficient reinforcement for use in tire treads, it is superior to thermal black and has found wide application in a variety of rubber goods in which abrasive wear is not a factor.

The channel process of carbon-black manufacture involves burning natural gas in a deficiency of air. The products are referred to as channel blacks, although

Table 10.—U.S. exports of carbon black, by countries

	1963		1964		1965	
	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars
North America:						
Canada	29,266	$2,435	22,578	$1,905	17,909	$1,624
Guatemala	1,482	128	1,364	123	1,411	127
Mexico	18,880	1,581	3,889	364	2,767	216
Other North America	114	10	84	15	202	19
Total	49,742	4,154	27,915	2,407	22,289	1,986
South America:						
Argentina	5,967	533	10,710	1,051	9,987	1,028
Brazil	6,600	578	4,749	407	3,712	322
Chile	5,273	488	5,762	588	5,828	568
Colombia	11,143	995	9,065	820	11,733	1,015
Peru	3,964	344	4,578	401	5,214	454
Uruguay	2,157	184	2,744	238	362	34
Venezuela	2,188	201	1,729	168	1,537	151
Other South America	1,332	121	1,315	126	1,047	96
Total	38,624	3,444	40,652	3,799	39,420	3,668
Europe:						
Austria	1,728	131	1,738	131	1,263	102
Belgium-Luxembourg	4,457	430	5,139	498	4,717	424
Czechoslovakia	4,616	410	265	23	2,205	189
Denmark	1,159	177	1,107	148	1,066	162
Finland	852	82	621	58	605	63
France	33,905	3,346	41,583	3,988	27,825	2,779
Germany, West	39,445	3,242	41,713	3,420	37,595	3,045
Greece	563	45	289	24	383	34
Ireland	88	13	27	5	113	14
Italy	32,746	3,194	21,317	2,129	21,919	2,262
Netherlands	6,738	647	8,433	836	3,707	418
Norway	1,382	129	998	96	1,067	101
Poland-Danzig	375	32	287	25	1,559	134
Portugal	2,229	211	2,526	238	1,866	182
Spain	3,129	376	4,435	482	2,667	337
Sweden	4,161	377	4,265	379	5,383	428
Switzerland	1,593	159	1,464	138	1,726	166
U.S.S.R.	18,631	1,602	3,512	303	35	3
United Kingdom	19,418	2,780	25,384	3,408	18,691	2,704
Yugoslavia	1,678	230	2,165	243	632	69
Other Europe	43	4	459	37	31	4
Total	178,936	17,617	167,727	16,609	135,055	13,620
Africa:						
South Africa, Republic of	15,330	1,301	16,287	1,405	11,861	1,005
United Arab Republic (Egypt)	2,333	214	1,029	88	25	2
Other Africa	771	72	1,463	127	1,053	101
Total	18,434	1,587	18,779	1,620	12,939	1,108
Asia:						
India	30,948	2,575	24,146	1,987	22,085	1,830
Indonesia	6,448	561	1,778	161	1,274	109
Iran	1,253	120	1,636	161	907	90
Israel	3,145	267	4,768	416	949	102
Japan	10,117	1,617	6,028	1,104	5,037	1,054
Korea, Republic of	3,356	302	6,154	597	5,683	478
Malaysia Republic	1,613	141	1,042	91	1,399	117
Pakistan	699	70	1,603	147	595	53
Philippines	9,357	843	10,220	890	8,100	721
Taiwan	1,310	115	427	55	229	47
Thailand	952	85	1,794	157	2,249	191
Turkey	3,833	339	6,102	508	6,400	546
Other Asia	2,172	226	2,396	239	2,125	199
Total	75,203	7,261	68,094	6,513	57,032	5,537
Oceania:						
Australia	6,588	636	7,134	653	4,967	486
New Zealand	3,401	311	3,606	328	2,906	253
Total	9,989	947	10,740	981	7,873	739
Grand total	370,928	35,010	333,907	31,929	274,608	26,658

Table 11.—World production of carbon black by countries [1]
(Thousand pounds)

Country [1]	1961	1962	1963	1964	1965 [p]
Argentina	----	NA	12,820	25,132	NA
Brazil	37,467	43,430	54,784	52,699	NA
France	[e] 101,400	138,890	167,991	185,627	NA
Germany, West	173,462	201,549	221,119	[r] 269,371	[e] 274,900
Italy	29,769	65,426	[r] 96,341	[r] 141,756	NA
Japan	93,936	147,025	176,882	243,602	NA
Netherlands	NA	NA	NA	105,821	NA
Rumania	62,589	65,082	73,142	78,030	80,918
South Africa, Republic of	4,123	16,840	21,402	26,334	NA
Spain	NA	2,866	2,866	3,307	NA
Taiwan	676	453	425	434	NA
United Kingdom	300,900	281,700	[r] 308,000	[r] 338,200	354,800
United States	1,979,552	2,056,464	2,058,916	2,223,216	2,353,776
Venezuela	----	NA	10,000	13,499	NA
Yugoslavia	9,696	8,234	9,438	[r] 10,818	[e] 12,300

[e] Estimate. [p] Preliminary. [r] Revised. NA Not available.
[1] Australia, China, India, Mexico, and Sweden produce carbon black but production data are not available. Canada's carbon black capacity was increased late in 1961 to about 100 million pounds annually. Actual production is not published to avoid disclosure of individual company data.

the term "gas blacks" as well as the term "impingment blacks" are also in common use.

Although the channel process has been almost replaced by the more efficient oil-furnace process as the principal source of rubber grades of carbon black, it still remains the principal source of the premium grades of the high-and intermediate color blacks used in the paint and lacquer industry, as well as the premium grades of halftone or lithographic blacks used in the printing-ink industry.

The thermal process produces coarser blacks, giving softer rubber stocks more desired for tire carcasses than the narrow range of fine-particle carbon blacks manufactured by the channel process. In the thermal process, which as the name implies is a thermal-cracking process, natural gas is preheated to 2,500° to 3,000° F. At these temperatures the gas decomposes to carbon and hydrogen.

TECHNOLOGY

Gradual replacement of the channel process by the more efficient oil-furnace process as the principal source of rubber grades of carbon black has brought about a serious problem, the short supply of feedstock necessary for the oil-furnace process. The ideal feedstock used by the carbon black industry in the manufacture of furnace black is a heavy, highly aromatic oil that has an API gravity in the range of 0° to 4° F., a pour point near 75°, a maximum sulfur content of 2 percent, and contains 75 percent aromatics and olefins. Also, to obtain good yields, the oils should have characterization factors of 10.1 to 10.8 and have a final boiling point not much above 750° F.

Such oils have been scarce for sometime because refiners cannot always afford economically to separate such small and necessarily uniform-quality stocks. Additionally, the technological changes in new refineries and the recent modernization of old plants have brought about a national shift of refinery output toward lighter and more valuable products. The heavy oils are converted into coke or asphalt. This means that from a barrel of crude oil there is a greatly reduced output of the heavier hydrocarbons, such as residual fuel oil and carbon black feedstock oils. Thus, there has been a sharp reduction in yields of residual oil. For every 100 barrels of crude oil processed in 1945, refiners obtained 27.2 barrels of residual fuel oil. By 1965, the average yield for the country as a whole had decreased to about eight barrels. Furthermore, the yields are less than five barrels in Texas and in Louisiana, where most carbon blacks are produced.

One recent development that may reduce the overall cost of feedstocks used for carbon black manufacture is the proposed expansion of import allocation eligibility to petrochemical plants including carbon black manufacturers. The proposal would grant crude oil and unfinished oil import allocations on the basis of their past runs of petroleum base oils. Sharing in the import program should reduce manufacturing costs.

The oil-furnace process, developed in 1943, represented a significant advance in the carbon black industry. The use of liquid hydrocarbons or oils was substituted for natural gas in the furnace process. The burner assemblies of the gas-furnace process was replaced by burner nozzles through which liquid hydrocarbons could be either atomized or vaporized into the furnace, together with the requisite amount of air. From the time of its introduction the oil-furnace process has steadily increased due to its high efficiency and versatility, taking over production from both the channel and gas-furnace process until more than three-quarters of all carbon black now produced is made by the oil-furnace process.

Lampblacks, the oldest member of the carbon-black family, are manufactured by slowly burning suitable oils and tars in a restricted supply of air. The smoke, carried by natural draft, passes into a series of settling chambers in which the black collects on the walls and floors and is periodically removed.

Natural Gas

By Richard F. Zaffarano[1] and Leonard L. Fanelli[2]

Contents

GENERAL SUMMARY

Marketed production of natural gas in the United States increased 3.7 percent in 1965 for a record high of 16,040 billion cubic feet. Most of the gain occurred in Louisiana, Texas, and New Mexico. Consumption at the end of 1965 was 16,033 billion cubic feet and the average value of natural gas at the wellhead was 15.6 cents per thousand cubic feet (Mcf).

In 1965, a west Texas wildcat well was acclaimed the world's new record holder for a depth producing well. The well drilled by Forest Oil and Robert J. Zonne et al, Charles J. Walker No. 1, is located in the Permian Basin, 20 miles northwest of Fort Stockton in Pecos County, Tex. This discovery well produced gas from the Ellenburger carbonates, through perforations in a 4-inch liner from 21,550 to 21,760 feet and from the open hole below the liner at 21,763 to 21,793 feet.[3]

Industrial consumption continued to dominate gas demand. Much industrial use occurs in Texas and Louisiana where gas holds a strong competitive margin because it is close to large industrial complexes. Interstate shipments of domestically produced gas in the southwest States are begining to decline because more of this gas is being consumed internally, particularly for petrochemicals. Intrastate gas has the added attraction of a shorter reserve life requirements, 15 instead of 20 years, than interstate gas, and the time interval between contract negotiations and gas delivery is far shorter. These advantages tend to offset the narrowing price gap between the two gas supplies. The best prospects for interstate gas development appear to be in gas from offshore Louisiana in Federal waters.

SCOPE OF REPORT

Data on natural gas production, consumption, and value are collected by annual surveys of oil and gas producers, natural gasoline plant operators, gas pipeline companies, and gas utility companies. Separate reports are obtained from respondents for each State in which they operate.

Gas volumes are reported or converted to a pressure base of 14.73 pounds per square inch absolute (psia) at 60° F. instead of base of 14.65 (psia), used previously. This change

[1] Petroleum engineer, Division of Petroleum.
[2] Survey statistician, Division of Statistics.
[3] World Oil. V. 160, No. 2, Feb. 1, 1965, p. 33.

Table 1.—Salient statistics of natural gas in the United States

	1961	1962	1963	1964	1965
Supply:					
Marketed production [1] million cubic feet	13,182,029	13,801,244	14,666,559	15,462,143	16,039,753
Withdrawn from storage do	694,258	849,695	911,741	880,498	959,865
Imports do	217,671	399,353	403,997	440,918	456,394
Total do	14,093,958	15,050,292	15,982,297	16,783,559	17,456,012
Disposition:					
Consumption do	13,010,654	13,814,678	14,560,953	15,451,979	16,033,189
Exports do	10,689	15,728	16,865	19,497	26,132
Stored do	839,083	935,712	1,041,802	1,009,302	1,077,980
Lost in transmission, etc. do	233,532	284,174	362,677	302,781	318,711
Total do	14,093,958	15,050,292	15,982,297	16,783,559	17,456,012
Value at wellhead:					
Total thousand dollars	1,996,241	2,145,301	2,328,030	2,387,689	2,494,542
Average cents per Mcf	15.1	15.5	15.9	15.4	15.6

[1] Comprises gas sold or consumed by producers, including gas loss due to natural gas liquids recovery, losses in transmission, quantities added to storage, and increases of gas in pipelines.

was adopted in response to the Bureau of the Budget's request to establish uniformity in reporting between Federal and industry gas statistics.

The reports received reflected approximately 80 percent of gross natural gas production. The large number of respondents and the difficulty of canvassing each small producer has made direct acquisition of total production impractical. Most of the output of nonreporting producers has been shown in purchase listings of reporting companies. Marketed production for each State equals consumption in the State, plus losses in transmission, gas placed in storage, and shipments to other States, less gas withdrawn from storage and receipts from other States.

TRENDS AND DEVELOPMENTS

The natural gas industry is reducing oversupply to meet a steady growth in demand but continues looking for new reserves. During the period 1950–65, marketed gas production has increased 250 percent while proved reserves have risen only 35 percent.

The search for reserves is not an all-out effort by industry such as the quest of 15 years ago; nevertheless, it has begun a new trend to purchase rather than explore and develop reserves because of the increased cost to locate sizable reserves. The trend to purchasing reserves began in 1963, and involved large volumes of offshore and south Louisiana gas. This trend is continuing; companies are putting together smaller reserves sales in nearby southwest areas to meet their requirements. Purchasing gas reserves has not significantly influenced gas well drilling under present industry conditions, nor is it expected to. The net increase in gas and condensate wells producing at yearend will probably continue at the present annual rate of 1,000 to 1,500 wells.

The Nation's key gas supply areas are in south and offshore Louisiana, the gulf coast and south Texas, and west Texas. Large expenditures were invested in south Louisiana because it contained the necessary growth incentives of good prices, close and excellent markets, and large reserves.

In 1965, it was reported that the U.S. gas industry spent a total of $1.9 billion on new facilities, $824 million for distribution expenditures and $770 million for transmission facilities, which in the aggregate represented over 80 percent of the total industry construction costs to serve its 35 million residential and 3 million commercial customers.

Improvements in liquefaction and transportation technology of liquefied natural gas (LNG) are enabling natural gas to begin supplying portions of an expanding world energy market with a prime energy source in countries that do not contain adequate indigenous sources of this fuel. Consequently, LNG is assuming a larger role in developing new markets in the United States, Europe, Japan, and South America.

Table 2.—Marketed production of natural gas and value at the wellhead in the United States [1]

State	Volume (million cubic feet) 1964	Volume (million cubic feet) 1965	Change from 1964 (percent)	Value at wellhead (thousand dollars) 1964	Value at wellhead (thousand dollars) 1965
Alabama	165	203	2.3	18	26
Alaska	6,238	7,255	1.6	1,719	1,799
Arizona	2,014	3,106	54.2	241	376
Arkansas	75,753	82,831	9.3	11,806	12,922
California	660,444	660,384	-----	198,551	204,059
Colorado	113,691	126,381	1.1	13,489	16,303
Florida	40	107	167.5	5	14
Illinois	7,824	7,396	−5.5	905	865
Indiana	199	239	20.1	47	56
Kansas	764,073	793,379	3.8	96,031	105,519
Kentucky	76,940	78,976	2.6	18,257	18,638
Louisiana	4,152,731	4,466,786	7.6	793,328	812,955
Maryland	1,373	408	−70.3	366	103
Michigan	31,388	34,558	10.1	7,984	8,674
Mississippi	180,428	166,825	−7.5	31,385	28,861
Missouri	107	84	−21.5	26	21
Montana	25,051	28,105	12.2	1,965	2,305
Nebraska	11,094	10,720	−3.4	1,707	1,565
New Mexico	873,947	937,205	7.2	101,932	110,590
New York	3,108	3,340	7.6	963	1,029
North Dakota	34,512	35,652	3.3	7,634	5,704
Ohio	37,106	35,684	−3.8	8,880	8,421
Oklahoma	1,316,201	1,320,995	0.4	166,747	182,297
Pennsylvania	81,720	84,461	3.4	22,349	22,551
Tennessee	77	85	10.4	15	16
Texas	6,490,202	6,636,555	2.3	809,180	858,396
Utah	79,739	71,616	−10.2	10,904	8,952
Virginia	1,600	3,152	97.0	479	942
West Virginia	202,765	207,416	2.3	50,968	48,743
Wyoming	231,613	235,849	1.8	29,808	31,840
Total	15,462,143	16,039,753	3.7	2,387,689	2,494,542

[1] Comprises gas either sold or consumed by producers, including gas loss due to natural gas liquids recovery, losses in transmission, quantities added to storage, and increases of gas in pipelines.

In the United States the use of LNG is becoming increasingly more prevalent. Installations are planned or in operation in Alabama, California, Massachusetts, New Jersey, New York, and Wisconsin. Refrigerated transoceanic tanker development is the key to this new emerging world trend in cyrogenic gas product markets that is expected to increase in the future.

The U.S. natural gas industry is entering a mature growth era with its future growth contingent upon its degree of success in finding and developing large supplies of gas at prices that will be competitive with those for electricity, coal, and oil.

CONSUMPTION

Industrial use.—Gas consumed by principal use in the United States at yearend of 1965 is shown in figure 2 and table 4. More than two-thirds of the gas sold was for industrial use—continuing a 30-year trend in this gas consumption category. As presented here, the term "All other industrial use," encompasses a variety of uses including electric utilities, chemical and allied products, iron and steel, stone, clay, and glass, food and kindred products, paper and allied products, and nonferrous metals and their products.

Texas and Louisiana consume most of the gas within the industrial classification. These two States comprise the major gas producing area, and consequently, gas in this region undersells the next cheaper competitor, fuel oil. Prices of industrial gas in eastern and midwestern States remain on competitive levels with coal and fuel oil. Price increases in any of these competitive fuels would result in readjustments in areas fuel demand patterns.

Field use of gas continued its historic trend as the second ranking subcategory of industrial gas use. This consumption is a most natural one, in view of the ubiquitous relationship of gas in regard to oil and gas well drilling, byproducts from natural gas processing, fuel for oil well pumping, and artificial gaslift operations.

Table 3.—Marketed production, interstate shipments, and total consumption of natural gas in the United States [1]

(Million cubic feet)

State by region or country	Marketed production: Quantity	Marketed production: Average value at wellhead (cents per Mcf)	Interstate movements: Quantity shipped	Interstate movements: Quantity received	Transmission loss and unaccounted for	Change in underground storage	Consumption: Volume	Consumption: Value (thousand dollars)	Consumption: Average (cents per Mcf)
New England:									
Connecticut	-------	----	-------	41,939	1,117	-------	40,822	62,626	153.4
Massachusetts	-------	----	-------	115,261	1,034	-------	114,227	169,651	148.5
New Hampshire	-------	----	-------	4,257	173	-------	4,084	6,598	161.6
Rhode Island	-------	----	-------	16,823	474	-------	16,349	24,535	150.1
Total:									
1965	-------	-----	-------	178,280	2,798	-------	175,482	263,410	150.1
1964	-------	-----	-------	163,568	977	-------	162,591	259,781	159.8
Middle Atlantic:									
New Jersey	-------	-----	-------	221,536	12,447	−668	209,757	285,436	136.1
New York	8,340	30.8	261	560,686	17,978	1,378	544,414	628,957	115.5
Pennsylvania	84,461	26.7	64,275	626,573	23,232	−5,958	629,485	518,471	81.6
Total:									
1965	87,801	26.9	64,536	1,408,795	53,657	−5,258	1,383,656	1,427,864	103.2
1964	84,828	27.5	65,827	1,370,998	54,009	21,954	1,314,036	1,341,497	102.1
East North Central:									
Illinois	7,396	11.7	2,366	794,604	8,015	19,527	772,092	560,050	72.5
Indiana	239	23.6	72	864,530	1,158	5,657	357,882	221,694	61.9
Michigan	34,558	25.1	-------	547,370	15,286	8,402	558,240	444,039	79.5
Ohio	35,684	23.6	1,043	868,102	7,641	15,463	879,639	631,300	71.8
Wisconsin	-------	----	-------	202,058	1,574	-------	200,484	165,598	82.6
Total:									
1965	77,877	23.1	3,481	2,776,664	33,674	49,049	2,768,337	2,022,681	73.1
1964	76,517	23.3	6,963	2,551,185	21,040	53,027	2,546,672	1,872,307	73.5
West North Central:									
Iowa	-------	----	-------	249,425	96	1,816	247,513	146,066	59.0
Kansas	793,379	13.3	500,005	187,585	9,040	7,582	464,337	146,833	31.6
Minnesota	-------	----	-------	247,835	−906	-------	248,741	160,314	64.5
Missouri	84	24.5	-------	341,204	−1,802	1,946	341,144	188,869	55.4
Nebraska	10,720	14.6	-------	159,385	692	1,381	168,032	79,894	47.5
North Dakota	35,652	16.0	9,137	4,134	331	-------	30,318	12,983	42.8
South Dakota	-------	----	-------	26,697	−277	-------	26,974	17,842	66.1

Total:									
1965	839,835	13.4	509,142	1,216,265	7,174	12,725	1,527,059	752,801	49.3
1964	809,786	13.0	510,480	1,185,955	14,779	21,070	1,449,412	712,823	49.2
South Atlantic:									
Delaware	-------	----	-------	18,522	431	122	17,969	16,665	92.7
District of Columbia	-------	----	-------	21,969	759	-------	21,210	29,374	138.5
Florida	107	12.9	-------	190,801	2,519	-------	188,389	91,274	48.4
Georgia	-------	----	-------	217,122	5,801	-------	211,321	130,129	61.6
Maryland	408	25.2	62	97,066	3,455	-------	93,957	111,184	118.1
North Carolina	-------	----	-------	78,419	2,674	-------	75,745	53,621	70.8
South Carolina	-------	----	-------	89,894	3,029	-------	86,865	51,176	58.9
Virginia	3,152	29.9	2,087	98,594	3,959	-------	95,700	90,781	94.9
West Virginia	207,416	23.5	154,127	129,692	−2,476	6,373	179,084	96,124	53.7
Total:									
1965	211,083	23.4	156,276	942,079	20,151	6,495	970,240	670,328	69.1
1964	205,778	25.0	145,792	892,819	21,804	769	930,232	674,715	72.5
East South Central:									
Alabama	203	12.7	29	232,083	2,941	164	229,152	113,370	49.5
Kentucky	78,976	23.6	61,116	176,924	4,529	7,427	182,828	99,437	54.4
Mississippi	166,825	17.3	122,075	214,543	9,545	−97	249,845	81,982	32.8
Tennessee	85	19.0	-------	208,044	6,630	-------	201,499	96,948	48.1
Total:									
1965	246,089	19.3	183,220	831,594	23,645	7,494	863,324	391,737	45.4
1964	257,610	20.1	185,284	785,149	16,594	4,124	836,757	391,926	46.8
West South Central:									
Arkansas	82,831	15.6	6,249	223,022	17,505	274	281,825	92,601	32.9
Louisiana	4,466,786	18.2	3,531,526	230,133	10,133	-------	1,155,260	272,933	23.6
Oklahoma	1,320,995	13.8	799,727	18,493	11,272	4,085	524,404	141,378	28.2
Texas	6,636,555	12.9	3,178,820	80,162	45,625	9,451	3,482,821	760,134	21.8
Total:									
1965	12,507,167	14.6	7,516,322	551,810	84,535	13,810	5,444,310	1,267,046	23.4
1964	12,034,887	14.8	7,118,238	554,320	107,301	4,359	5,359,309	1,283,561	24.0
Mountain:									
Arizona	3,106	12.1	1,447	154,485	1,655	-------	154,489	73,693	47.7
Colorado	126,381	12.9	54,771	174,712	4,555	5,022	236,745	98,385	41.6
Idaho	-------	----	-------	31,797	−2,092	-------	33,889	19,289	56.9
Montana	28,105	8.2	1,289	57,366	1,250	12,037	70,895	33,265	46.9
Nevada	-------	----	-------	27,989	310	-------	27,679	17,966	64.9
New Mexico	937,205	11.8	698,217	45,175	23,051	−2,686	263,798	65,880	25.0
Utah	71,616	12.5	21,517	72,183	7,496	185	114,601	49,076	42.8
Wyoming	235,849	13.5	165,654	6,432	1,326	5,003	70,298	19,000	27.0
Total:									
1965	1,402,262	12.1	942,895	570,139	37,551	19,561	972,394	376,554	38.7
1964	1,326,055	11.9	903,025	576,590	26,610	12,599	960,411	371,001	38.6

Table 3.—Marketed production, interstate shipments, and total consumption of natural gas in the United States [1]—Continued

(Million cubic feet)

State by region or country	Marketed production: Quantity	Marketed production: Average value at wellhead (cents per Mcf)	Interstate movements: Quantity shipped	Interstate movements: Quantity received	Transmission loss and unaccounted for	Change in underground storage	Consumption: Volume	Consumption: Value (thousand dollars)	Consumption: Average (cents per Mcf)
Pacific:									
Alaska	7,255	24.8	-------	-------	333	-------	6,922	5,193	76.1
California	660,384	30.9	-------	1,162,803	51,661	14,234	1,757,292	1,080,822	61.5
Oregon	-------	----	-------	58,259	2,194	-------	56,065	40,146	71.6
Washington	-------	----	-------	109,446	1,338	-------	108,108	69,056	63.9
Total:									
1965	667,639	30.8	-------	1,330,508	55,526	14,234	1,928,387	1,195,217	62.0
1964	666,682	30.0	-------	1,276,446	39,667	10,902	1,892,559	1,112,777	58.8
Total United States:									
1965	16,039,753	15.6	9,375,872	9,806,134	318,711	118,115	16,033,189	8,367,638	52.2
1964	15,462,143	15.4	8,935,609	9,357,030	302,781	128,804	15,451,979	8,020,388	51.9
Foreign:									
Canada	-------	----	404,686	17,979	-------	-------	-------	-------	-----
Mexico	-------	----	51,708	8,153	-------	-------	-------	-------	-----
Grand total movements: [1]									
1965	-------	----	9,832,266	9,832,266	-------	-------	-------	-------	-----
1964	-------	----	[2] 9,376,527	[3] 9,376,527	-------	-------	-------	-------	-----

[1] No shipments were made into Maine, Vermont, and Hawaii.
[2] Includes total foreign shipments of 440,918 million cubic feet.
[3] Includes total foreign receipts of 19,497 million cubic feet.

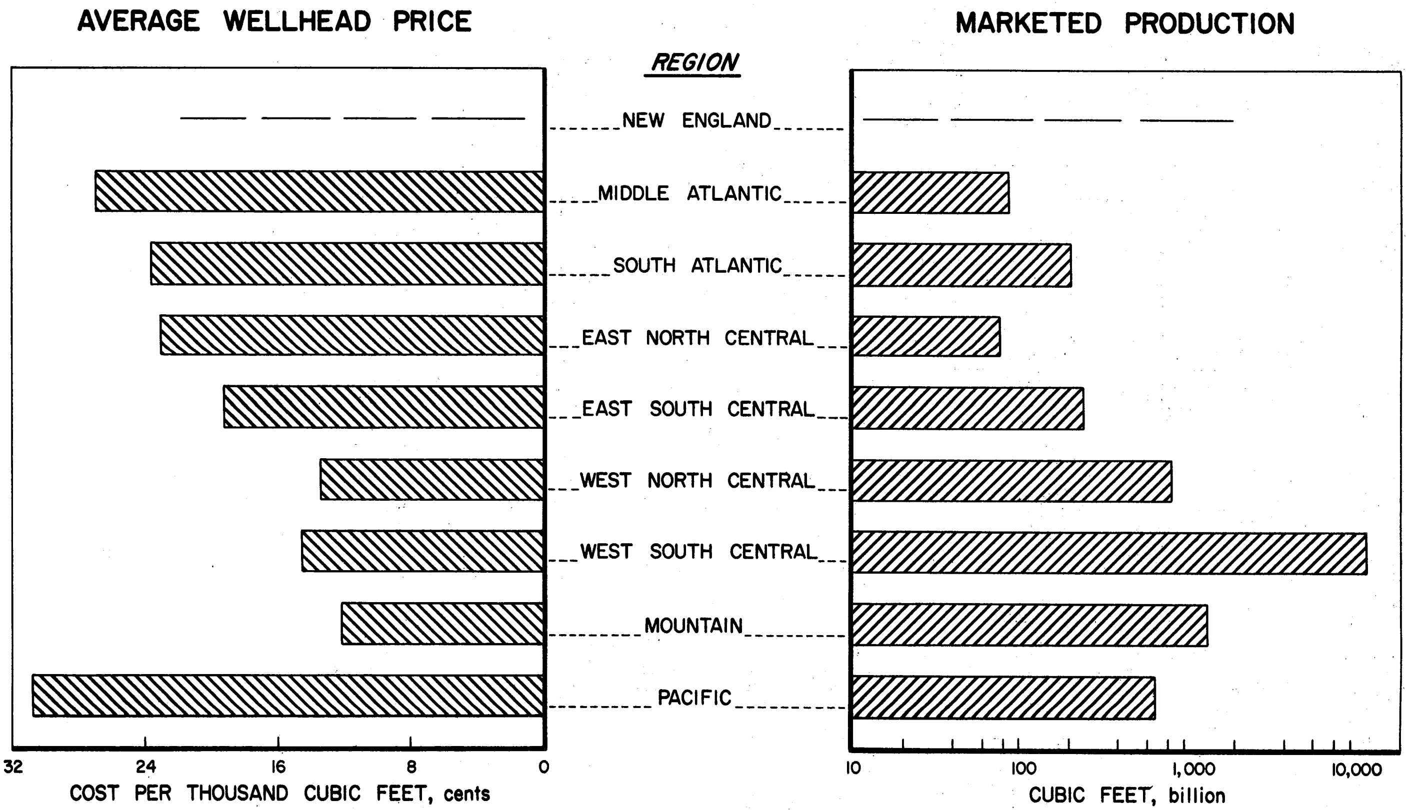


Figure 1.—Marketed production of natural gas by regions and average wellhead prices

Table 4.—Number of consumers and volume of natural gas consumed by principal uses in the United States [1]

State by region	Number of consumers (in thousands)		Volume of natural gas, million cubic feet									
					Industrial							
	Residential	Commercial	Residential	Commercial	Field (pumping, drilling, extraction loss, and plant fuel)	Carbon black	Petroleum refineries	Used as pipeline fuel	All other industrial fuel including electric utilities	Total industrial	Total consumption	Consumed at electric utilities (included in other industrial use) [2]
New England:												
Connecticut	354	25	22,232	5,734	-------	-------	-------	100	12,756	12,856	40,822	337
Massachusetts	965	61	64,852	16,301	-------	-------	-------	233	32,841	33,074	114,227	13,131
New Hampshire	35	2	2,627	801	-------	-------	-------	-------	656	656	4,084	------
Rhode Island	150	8	8,965	2,568	-------	-------	-------	98	4,718	4,816	16,349	483
Total	1,504	96	98,676	25,404	-------	-------	-------	431	50,971	51,402	175,482	13,951
Middle Atlantic:												
New Jersey	1,496	115	114,405	20,207	-------	-------	1,253	451	73,441	75,145	209,757	22,440
New York	3,790	280	287,555	86,540	433	-------	-------	3,309	166,577	170,319	544,414	74,188
Pennsylvania	2,095	132	255,609	67,545	2,782	-------	23,733	19,344	260,472	306,331	629,485	1,292
Total	7,381	527	657,569	174,292	3,215	-------	24,986	23,104	500,490	551,795	1,383,656	97,920
East North Central:												
Illinois	2,500	170	341,984	128,996	15,814	-------	18,194	13,372	253,732	301,112	772,092	34,679
Indiana	872	83	114,357	42,259	22	-------	11,231	8,033	181,980	201,266	357,882	13,058
Michigan	1,687	138	270,996	84,834	5,291	-------	2,127	4,559	190,433	202,410	558,240	2,979
Ohio	2,310	174	412,024	126,856	1,993	-------	10,029	11,057	317,680	340,759	879,639	2,965
Wisconsin	642	46	79,442	23,541	-------	-------	(3)	1,531	[3] 95,970	97,501	200,484	14,477
Total	8,011	611	1,218,803	406,486	23,120	-------	41,581	38,552	1,039,795	1,143,048	2,768,337	68,158
West North Central:												
Iowa	534	72	77,259	38,702	-------	-------	-------	11,070	120,482	131,552	247,513	52,085
Kansas	573	56	86,793	38,472	29,263	-------	29,579	49,710	230,520	339,072	464,337	112,690
Minnesota	588	49	86,481	26,882	-------	-------	(3)	1,180	[3] 134,198	135,378	248,741	51,324
Missouri	864	66	129,542	40,988	-------	-------	(3)	8,925	[3] 161,689	170,614	341,144	47,602
Nebraska	337	47	47,631	25,506	4,014	-------	(3)	8,659	[3] 82,222	94,895	168,032	36,178
North Dakota	42	6	6,592	4,963	15,247	-------	(3)	2	[3] 3,514	18,763	30,318	25
South Dakota	67	9	10,095	8,801	9	-------	-------	30	8,039	8,078	26,974	3,359
Total	3,005	305	444,393	184,314	48,533	-------	29,579	79,576	740,664	898,352	1,527,059	303,263

South Atlantic:												
Delaware	70	5	5,694	1,298	-------	-------	(3)	-------	[3] 10,977	10,977	17,969	4,611
District of Columbia	(4)	(4)	(4)	(4)	-------	-------	-------	-------	(4)	(4)	(4)	-------
Florida	320	23	8,135	12,731	3,767	-------	-------	2,529	161,227	167,523	188,389	87,001
Georgia	663	52	67,167	26,052	-------	-------	(3)	4,761	[3] 113,341	118,102	211,321	831
Maryland	[4] 753	[4] 60	[4] 67,481	[4] 18,816	8	-------	-------	1,216	[4] 27,646	[4] 28,870	[4] 115,167	56
North Carolina	177	25	14,587	7,271	-------	-------	-------	4,272	49,615	53,887	75,745	2,895
South Carolina	205	19	11,935	7,043	-------	-------	-------	2,301	65,586	67,887	86,865	18,805
Virginia	404	45	36,307	14,806	50	-------	-------	6,743	37,794	44,587	95,700	2,268
West Virginia	334	29	49,645	14,524	16,729	-------	616	17,995	79,575	114,915	179,084	932
Total	2,926	258	260,951	102,541	20,554	-------	616	39,817	545,761	606,748	970,240	117,399
East South Central:												
Alabama	556	38	48,085	31,963	156	-------	(3)	11,998	[3] 136,950	149,104	229,152	5,519
Kentucky	456	45	64,094	21,343	12,758	-------	(3)	27,632	[3] 57,001	97,391	182,828	453
Mississippi	292	33	24,112	12,407	14,977	-------	(3)	45,265	[3] 153,084	213,326	249,845	56,118
Tennessee	380	46	37,159	28,290	-------	-------	(3)	22,693	[3] 113,357	136,050	201,499	16,252
Total	1,684	162	173,450	94,003	27,891	-------	-------	107,588	460,392	595,871	863,324	78,342
West South Central:												
Arkansas	351	50	36,500	27,953	14,847	-------	10,491	11,341	180,693	217,372	281,825	67,274
Louisiana	771	69	61,048	22,567	244,040	22,278	105,026	54,102	646,199	1,071,645	1,155,260	175,616
Oklahoma	595	63	64,848	27,219	122,534	-------	46,142	12,556	251,105	432,337	524,404	127,388
Texas	2,300	240	182,590	80,612	1,068,562	50,906	469,799	67,532	1,562,820	3,219,619	3,482,821	638,603
Total	4,017	422	344,986	158,351	1,449,983	73,184	631,458	145,531	2,640,817	4,940,973	5,444,310	1,008,881
Mountain:												
Arizona	347	34	25,186	19,234	190	-------	-------	18,002	91,877	110,069	154,489	36,421
Colorado	437	58	65,374	39,275	15,237	-------	1,407	1,906	113,546	132,096	236,745	35,451
Idaho	48	9	4,889	5,062	-------	-------	-------	1,058	22,880	23,938	33,889	-------
Montana	125	19	19,908	14,110	6,149	-------	4,207	426	26,095	36,877	70,895	1,992
Nevada	49	3	4,142	2,389	-------	-------	-------	-------	21,148	21,148	27,679	13,263
New Mexico	222	25	24,237	12,569	[5] 118,877	(5)	2,570	24,905	80,640	226,992	263,798	43,853
Utah	229	26	30,665	15,523	8,675	-------	5,215	402	54,121	68,413	114,601	4,775
Wyoming	66	9	10,741	8,043	27,046	-------	9,829	2,209	12,430	51,514	70,298	187
Total	1,523	183	185,142	116,205	[5] 176,174	(5)	23,228	48,908	422,737	671,047	972,394	135,942
Pacific:												
Alaska	7	1	1,437	2,270	1,005	-------	-------	-------	2,210	3,215	6,922	2,083
California	4,938	381	489,147	163,532	[5] 179,334	(5)	82,603	15,647	829,029	1,104,613	1,757,292	492,201
Oregon	136	18	10,863	5,592	-------	-------	-------	682	38,928	39,610	56,065	113
Washington	170	27	17,385	10,658	-------	-------	-------	688	79,377	80,065	108,108	-------
Total	5,251	427	518,832	182,052	[5] 180,339	(5)	82,603	17,017	947,544	1,227,503	1,928,387	494,397
Total United States:												
1965	35,302	2,991	3,902,802	1,443,648	1,909,697	93,296	859,899	500,524	7,323,323	10,686,739	16,033,189	2,318,253
1964	34,575	2,884	3,766,719	1,367,249	2,082,029	106,179	820,989	433,204	6,875,610	10,318,011	15,451,979	2,321,889

[1] Includes natural gas which is distributed as component of mixed gas.
[2] Federal Power Commission, preliminary figures.
[3] 25,848 million cubic feet included in "All other industrial fuel" to avoid disclosure; included in U. S. Petroleum refineries fuel" total.
[4] District of Columbia included with Maryland to avoid disclosure.
[5] 20,112 million cubic feet included in "Field" to avoid disclosure; included in U. S. "Carbon black" total.

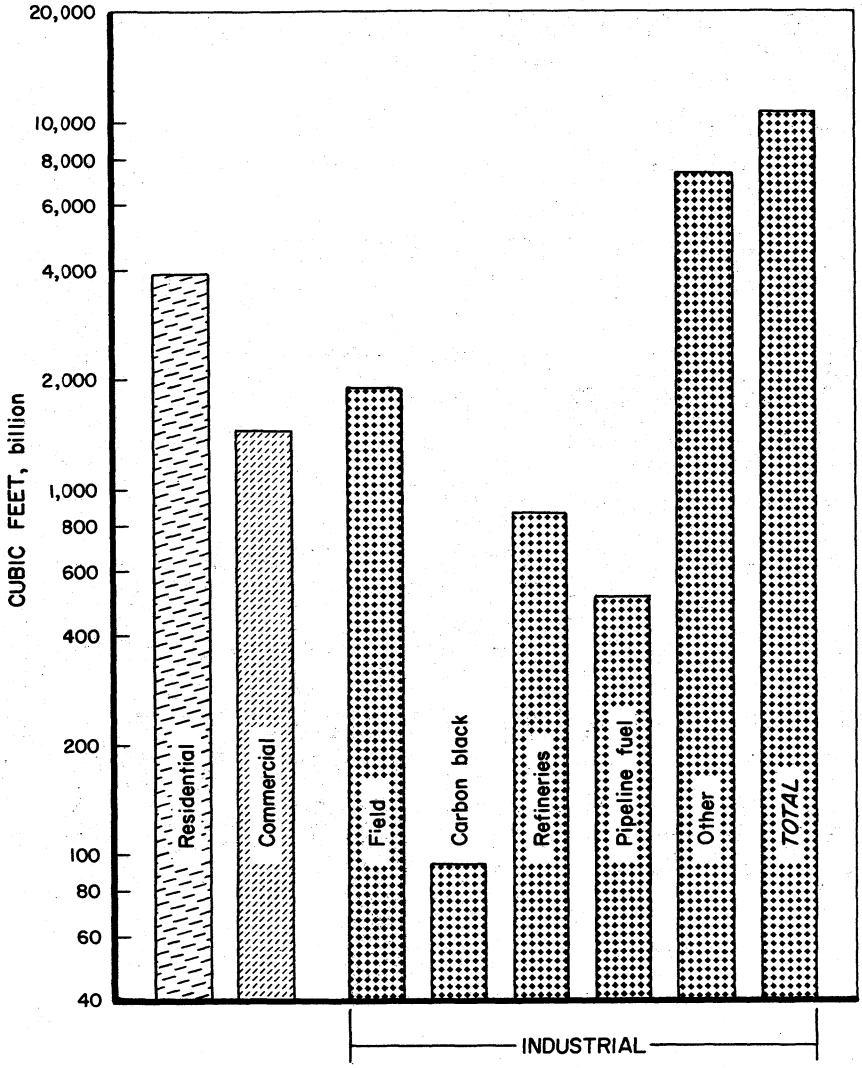


Figure 2.—Disposition of natural gas consumed in United States by principal use, billion cubic feet

The remaining subcategories of industrial refinery and pipeline fuel continued to grow in agreement with historic trends. Consumption of gas in the manufacture of carbon black in 1965 is continuing a downtrend which began in 1947; the advent of large diameter pipelines enabled the industry to transport gas to all consuming areas, and gas was diverted from carbon black manufacture to residential, commercial, and industrial uses. The 1965 carbon black consumption of gas had declined below the 1932 level.

Residential and commercial.—Natural gas continued to gain in residential and commercial markets during 1965. Future growth will depend on the degree of effectiveness it achieves in meeting competition from electricity, especially in regards to residential construction, large buildings, and shopping centers. The Total Energy concept, a single fuel source that provides all the varied energy requirements of a consumer, and gas air conditioning continue to hold some promise for the gas industry, but such loads are not likely to be overly significant in relation to growth in industrial load.

Results of the American Gas Association (AGA) Heating Survey show more than 1 million customers installed gas heating in 1965, bringing the total number of gas individual househeating customers to over 26.8 million, a gain of 3.7 percent over the 1964 figure. New homes represented over 60 percent of this increase; conversion from other fuels in existing dwellings represented about 40 percent of the increase. In addition to these, 2.5 million multifamily dwellings received gas heat from a central source, bringing the total number of families served by gas heating to 29.3 million, a gain of 4.2 percent over the 1964 figure.

The East North Central region leads the Nation in house-heating customers and the Pacific region ranks second. The industry expects the New England region to grow most in the next 3 years in house-heating customers associated with conversions rather than new construction.

RESERVES

Estimates of proved recoverable natural gas reserves by the AGA Committee on Natural gas Reserves show the 1965 gas reserves are 286.5 trillion cubic feet. The disposition of the annual gross additions to gas reserves for the period 1947–65, are given in figure 3. Over two thirds of the gross additions in 1965 were the result of extensions of old fields and revisions of previous estimates reflecting the continued 9-year downtrend (1957–65) in drilling in the United States.

Despite the third largest record of annual gross additions in gas reserves of 21.3 trillion cubic feet in 1965, such additions have not been sufficient to overcome the gain in gas consumption and production. Consequently, the declining trend in ratio of reserves to annual production continued and currently is at a 20-year low of 17.6 years. The individual value of reserves to production in itself is not significant, but if the declining trend continues the industry will find it difficult to meet future demands for gas.

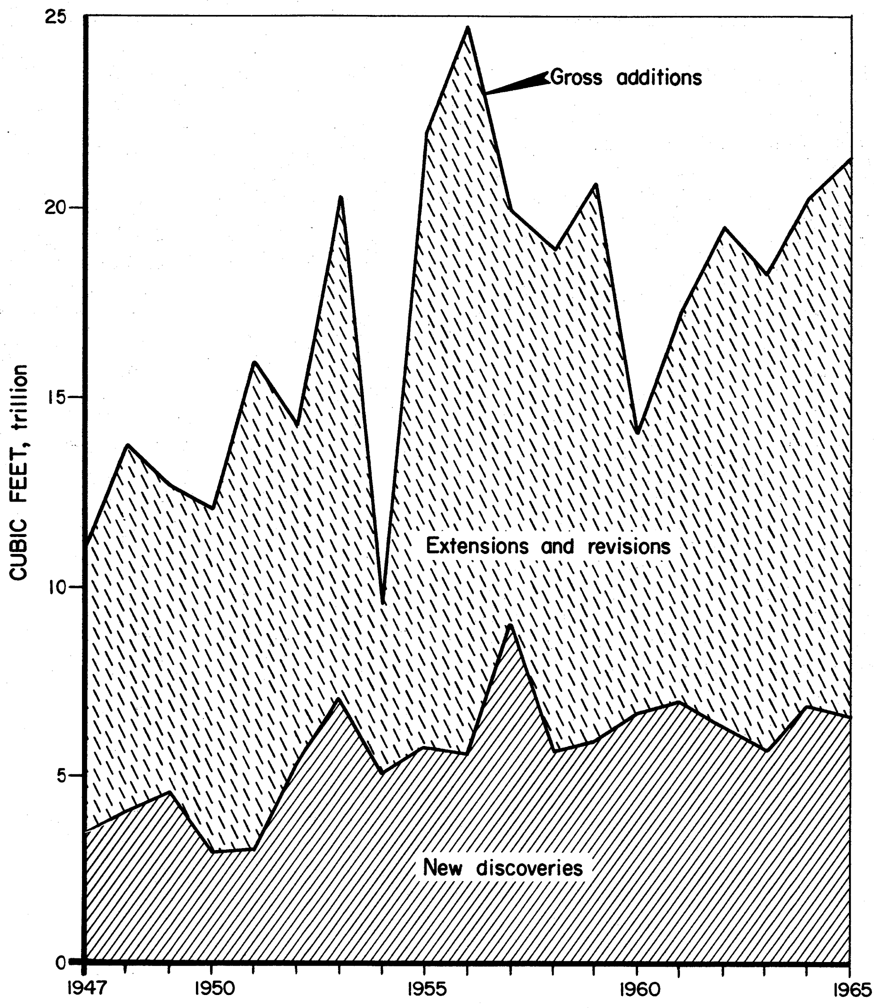
Of the 21.3 trillion cubic feet of additions to gas reserves, 8.5 were in Texas, 8.3 in Louisiana, and 1.9 in Oklahoma, and the majority of the remainder was in New Mexico, West Virginia, and California.

STORAGE

The continuing interest in the development of underground gas storage plays an important role in the growth of the gas industry. This growth would not have been possible without the use of large volumes of gas storage facilities as part of the major natural gas transmission systems, whereby gas is transported from large supply areas to reservoirs close to major market areas, and stored until needed to supplement market requirements for load balancing and peak shaving operations.

Underground natural gas storage continued a 15-year uptrend in 1965; there were 293 storage reservoirs in 24 states for a total capacity of 4.0 trillion cubic feet (table 7). About 1.0 trillion cubic feet (table 8) were injected as input to underground storage which approximates the previous years' injected volumes.

The increase of 143.8 billion cubic feet in yearly storage capacity is a gain of 3.5 percent over the 1964 figure, emphasizing



Source: A.G.A.

Figure 3.—Trends in annual gross additions to natural gas reserves, trillion cubic feet, 1947–65

Table 5.—Estimated proved recoverable reserves of natural gas in the United States
(Million cubic feet at 14.73 psia at 60° F)

State	Changes in reserves during 1965				
	Reserves as of December 31, 1964 [1]	Extensions and revisions [1]	Discoveries of new fields and new pools in old fields [1]	Net change in underground storage [2]	Net production [3]
Alaska	1,831,365	66,062	95,500	0	7,602
Arkansas	2,100,092	200,737	57,760	274	89,851
California [4]	9,053,707	278,912	107,675	13,860	621,719
Colorado	1,729,258	82,015	17,795	851	112,323
Illinois	179,501	5,816	42	30,920	6,605
Indiana	71,268	−1,055	32	4,943	2,823
Kansas	17,278,142	71,951	48,430	6,510	808,629
Kentucky	1,094,355	44,051	20,064	14,757	81,033
Louisiana [4]	79,076,309	6,189,708	2,158,790	129	4,613,779
Michigan	774,276	−21,240	13,150	15,438	35,820
Mississippi	2,355,764	−269,136	70,483	−96	183,568
Montana	590,269	23,596	440	12,036	30,489
Nebraska	93,383	−3,694	203	740	11,028
New Mexico	15,354,435	879,548	79,084	−3,536	934,973
New York	133,489	3,447	860	1,457	3,544
North Dakota	1,110,645	51,072	602	0	41,095
Ohio	709,421	43,030	5,600	36,909	40,123
Oklahoma	19,757,235	1,539,684	359,325	4,819	1,303,649
Pennsylvania	1,243,575	93,031	15,020	−11,935	82,662
Texas [4]	118,855,055	5,112,134	3,348,672	5,302	6,704,403
Utah	1,519,403	−25,130	7,519	184	63,180
Virginia	32,180	4,102	420	0	4,226
West Virginia	2,347,945	300,705	39,179	4,432	198,238
Wyoming	3,768,560	100,726	96,064	4,736	266,766
Other States [5]	191,822	5,498	1,000	7,753	4,165
Total	281,251,454	14,775,570	6,543,709	150,483	16,252,293

State	Reserves as of December 31, 1965				
	Nonassociated [6]	Associated [7]	Dissolved [8]	Underground storage [9]	Total
Alaska	1,878,447	0	106,878	0	1,985,325
Arkansas	1,978,943	86,990	179,052	24,027	2,269,012
California [4]	3,203,491	1,641,245	3,771,619	216,080	8,832,435
Colorado	1,418,047	66,004	227,129	6,416	1,717,596
Illinois	1,149	0	33,223	175,302	209,674
Indiana	502	573	13,166	58,124	72,365
Kansas	15,921,055	399,879	176,139	99,331	16,596,404
Kentucky	968,577	0	63,636	59,981	1,092,194
Louisiana [4]	68,730,464	8,965,518	5,114,334	841	82,811,157
Michigan	108,141	74,281	52,893	510,489	745,804
Mississippi	1,445,243	177,638	344,109	6,457	1,973,447
Montana	373,440	20,477	83,195	118,740	595,852
Nebraska	42,058	8,166	15,262	14,118	79,604
New Mexico	11,728,486	1,925,716	1,697,373	22,983	15,374,558
New York	38,801	0	281	96,627	135,709
North Dakota	6,875	317,884	796,465	0	1,121,224
Ohio	233,942	0	92,661	428,234	754,837
Oklahoma	15,527,864	2,751,488	1,939,960	138,102	20,357,414
Pennsylvania	730,903	0	16,547	509,579	1,257,029
Texas [4]	82,822,443	24,906,235	12,805,937	82,145	120,616,760
Utah	851,438	356,782	229,540	1,036	1,438,796
Virginia	32,476	0	0	0	32,476
West Virginia	2,078,623	0	60,843	354,557	2,494,023
Wyoming	3,161,045	157,835	359,169	25,271	3,703,320
Other States [5]	32,821	0	27,281	141,806	201,908
Total	213,315,274	41,856,711	28,206,692	3,090,246	286,468,923

[1] Excludes gas loss due to natural gas liquids recovery.
[2] Net difference between gas stored in and gas withdrawn from underground storage reservoirs, including adjustments and native gas transferred from other reserves categories.
[3] Net production equals gross withdrawals less gas injected into producing reservoirs. Changes in underground storage and gas loss due to natural gas liquids recovery are excluded. Fourth quarter production estimated in some instances.
[4] Includes offshore reserves.
[5] Includes Alabama, Arizona, Florida, Iowa, Maryland, Missouri, Tennessee, and Washington.
[6] Free gas not in contact with crude oil in the reservoir and free gas in contact with oil, where the production of such gas is not significantly affected by the production of crude oil.
[7] Free gas in contact with crude oil in the reservoir where the production of such gas is significantly affected by the production of crude oil.
[8] Gas in solution with crude oil in the reservoirs.
[9] Gas held in underground reservoirs (including native and net injected gas) for storage.

Source: Committee on Natural Gas Reserves, AGA.

Table 6.—Gross withdrawals and disposition of natural gas in the United States

(Million cubic feet)

State	Gross withdrawals			Disposition		
	From gas wells [1]	From oil wells [1]	Total [2]	Marketed production [3]	Repressuring	Vented and flared [4]
1964:						
Alaska	8,800	3,100	11,900	6,238	5,414	248
Arkansas	58,900	41,900	100,800	75,753	21,411	3,636
California	288,700	625,800	914,500	660,444	242,957	11,099
Colorado	71,500	74,500	146,000	113,691	28,133	4,176
Illinois	1,100	6,800	7,900	7,824	-----	76
Indiana	100	2,500	2,600	199	-----	2,401
Kansas	740,200	40,800	781,000	764,073	11	16,916
Kentucky	70,500	6,500	77,000	76,940	-----	60
Louisiana	3,682,200	808,400	4,490,600	4,152,731	221,280	116,589
Maryland	1,400	-----	1,400	1,373	-----	27
Michigan	21,100	12,600	33,700	31,388	1,608	704
Mississippi	128,000	88,600	216,600	180,428	27,152	9,020
Montana	19,300	7,500	26,800	25,051	618	1,131
Nebraska	7,500	5,100	12,600	11,094	-----	1,506
New Mexico	591,500	296,600	888,100	873,947	9,160	4,993
New York	3,100	100	3,200	3,108	-----	92
North Dakota	1,000	44,900	45,900	34,512	5,680	5,708
Ohio	31,600	6,000	37,600	37,106	99	395
Oklahoma	921,100	494,500	1,415,600	1,316,201	68,555	30,844
Pennsylvania	79,800	2,500	82,300	81,720	221	359
Texas	5,882,600	1,698,100	7,580,700	6,490,202	973,676	116,822
Utah	45,700	52,300	98,000	79,739	16,597	1,664
Virginia	1,600	-----	1,600	1,600	-----	-----
West Virginia	200,400	2,500	202,900	202,765	112	23
Wyoming	175,400	83,100	258,500	231,613	15,477	11,410
Other States [5]	2,100	400	2,500	2,403	-----	97
Total	13,035,200	4,405,100	17,440,300	15,462,143	1,638,161	339,996
1965:						
Alaska	8,900	3,900	12,800	7,255	5,469	76
Arkansas	57,500	46,500	104,000	82,831	20,155	1,014
California	292,600	612,400	905,000	660,384	238,838	5,778
Colorado	75,400	79,800	155,200	126,381	23,858	4,961
Illinois	1,000	6,500	7,500	7,396	-----	104
Indiana	100	2,300	2,400	239	-----	2,161
Kansas	766,100	40,700	806,800	793,379	117	13,304
Kentucky	72,700	6,400	79,100	78,976	-----	124
Louisiana	3,912,300	852,000	4,764,300	4,466,786	174,951	122,563
Maryland	408	-----	408	408	-----	-----
Michigan	24,700	12,200	36,900	34,558	1,900	442
Mississippi	113,300	84,900	198,200	166,825	21,699	9,676
Montana	22,200	7,600	29,800	28,105	579	1,116
Nebraska	7,200	4,900	12,100	10,720	115	1,265
New Mexico	635,900	320,600	956,500	937,205	10,706	8,589
New York	3,040	300	3,340	3,340	-----	-----
North Dakota	2,800	45,200	48,000	35,652	6,464	5,884
Ohio	30,800	5,100	35,900	35,684	-----	216
Oklahoma	920,300	493,700	1,414,000	1,320,995	57,262	35,743
Pennsylvania	82,100	2,800	84,900	84,461	398	41
Texas	6,052,200	1,688,400	7,740,600	6,636,555	1,001,173	102,872
Utah	45,200	46,900	92,100	71,616	19,794	690
Virginia	3,152	-----	3,152	3,152	-----	-----
West Virginia	204,800	2,700	207,500	207,416	16	68
Wyoming	186,100	72,800	258,900	235,849	20,710	2,341
Other States [5]	2,800	900	3,700	3,585	-----	115
Total	13,523,600	4,439,500	17,963,100	16,039,753	1,604,204	319,143

[1] Estimated from the annual Bureau of Mines Supply and Distribution, Natural Gas Survey.

[2] Marketed production plus quantities used in repressuring, vented and flared.

[3] Comprises gas sold or consumed by producers, including gas loss due to natural gas liquids recovery, losses in transmission, quantities added to storage, and increase of gas in pipelines.

[4] Partly estimated; includes direct losses on producing properties and residue blown to the air.

[5] Alabama, Arizona, Florida, Missouri, South Dakota, and Tennessee.

the continued efforts of industry to supply natural gas throughout the United States. Approximately 80 percent of the Nation's gas storage is concentrated in the Appalachian and Central Plain States utilizing depleted gas fields. This trend undoubtedly will continue because the economics are in favor of such storage to meet inherent cyclic gas demands. In addition, 15 new projects were under construction which will add at least 275 billion cubic feet of storage capacity.

About one-eighth of the current underground gas storage has been developed in petroleum-barren aquifers (water-bearing beds), geologic domes, or anticlines in

Table 7.—Underground storage statistics, December 31, 1965
(Million cubic feet at 14.73 psia at 60° F)

State	Number of pools	Number of active wells	Total gas in storage reservoirs (million cubic feet)	Total reservoir capacity (million cubic feet)
Arkansas	6	26	16,343	24,027
California	6	145	144,555	283,318
Colorado	2	22	5,048	8,061
Illinois	17	697	164,496	339,956
Indiana	20	644	45,216	58,140
Iowa	5	168	115,066	160,695
Kansas	16	742	85,915	103,417
Kentucky	16	560	47,978	67,518
Louisiana	1	3	341	1,000
Michigan	27	1,844	278,023	555,783
Mississippi	2	23	5,951	6,943
Missouri	2	62	25,927	70,000
Montana	5	136	81,558	155,637
Nebraska	1	14	3,059	39,270
New Mexico	3	34	2,164	57,802
New York	15	723	88,402	108,823
Ohio	17	2,658	335,265	499,700
Oklahoma	10	96	121,561	252,780
Pennsylvania	67	2,098	487,653	697,481
Texas	15	149	63,782	96,641
Utah	1	8	1,036	1,058
Washington	1	20	813	20,000
West Virginia	36	1,244	319,531	415,220
Wyoming	2	9	18,336	62,628
Total	293	12,125	2,458,019	4,085,898

Source: AGA.

Table 8.—Natural gas stored underground in and withdrawn from storage fields
(Million cubic feet)

State	1964			1965		
	Total stored	Total withdrawn	Net stored	Total stored	Total withdrawn	Net stored
Alabama	-----	-----	-----	166	2	164
Arkansas	1,544	915	629	1,247	973	274
California	72,482	61,580	10,902	64,304	50,070	14,234
Colorado	3,816	2,516	1,300	5,104	82	5,022
Delaware	438	388	50	568	446	122
Illinois	49,135	31,753	17,382	55,276	35,749	19,527
Indiana	23,293	11,932	11,361	23,884	18,227	5,657
Iowa	39,595	27,569	12,026	35,092	33,276	1,816
Kansas	42,521	38,509	4,012	45,860	38,278	7,582
Kentucky	19,322	15,770	3,552	24,712	17,285	7,427
Michigan	170,038	153,649	16,389	197,553	189,151	8,402
Mississippi	4,544	3,972	572	4,051	4,148	−97
Missouri	7,117	5,179	1,938	7,150	5,204	1,946
Montana	16,990	5,660	11,330	18,876	6,839	12,037
Nebraska	5,119	2,025	3,094	3,749	2,368	1,381
New Jersey	794	1,097	−303	868	1,536	−668
New Mexico	6,538	5,045	1,493	6,556	9,242	−2,686
New York	38,414	33,434	4,980	39,638	38,265	1,373
Ohio	130,900	123,005	7,895	140,530	125,067	15,463
Oklahoma	21,851	22,488	−637	24,797	20,712	4,085
Pennsylvania	196,610	179,333	17,277	194,379	200,337	−5,958
Texas	29,345	24,978	4,367	28,952	19,501	9,451
Utah	641	574	67	843	658	185
West Virginia	125,791	125,072	719	147,523	141,150	6,373
Wyoming	2,464	4,055	−1,591	6,302	1,299	5,003
Total	1,009,302	880,498	128,804	1,077,980	959,865	118,115

Table 9.—Natural gas moving interstate, imports, and exports, 1965

(Million cubic feet)

State by region or country	Quantity received	Producing region: Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Canada	Mexico
New England:										
Connecticut	41,939	2,342	4	------	40	965	37,267	------	------	1,321
Massachusetts	115,261	4,938	8	------	94	1,971	105,584	------	------	2,666
New Hampshire	4,257	------	------	------	2	5	4,248	------	------	2
Rhode Island	16,823	995	1	------	14	403	14,855	------	------	555
Total	178,280	8,275	13	------	150	3,344	161,954	------	------	4,544
Middle Atlantic:										
New Jersey	221,536	8,111	13	------	189	2,903	206,347	------	------	3,973
New York	560,686	39,997	33	1	10,083	5,163	495,929	------	3,144	6,336
Pennsylvania	626,573	1,711	151	9	49,374	13,874	546,979	------	------	14,475
Total	1,408,795	49,819	197	10	59,646	21,940	1,249,255	------	3,144	24,784
East North Central:										
Illinois	794,604	------	2	37,609	------	262	754,406	1,424	295	606
Indiana	364,530	------	2,249	31,292	------	2,114	328,048	37	------	790
Michigan	547,370	------	------	41,715	------	1,264	503,915	16	266	194
Ohio	868,102	4,524	394	27,974	68,532	35,279	718,856	------	------	12,543
Wisconsin	202,058	------	107	10,996	------	------	122,670	2,120	66,165	------
Total	2,776,664	4,524	2,752	149,586	68,532	38,919	2,427,895	3,597	66,726	14,133
West North Central:										
Iowa	249,425	------	------	40,093	------	------	199,390	9,942	------	------
Kansas	187,585	------	------	6,640	------	------	177,986	2,959	------	------
Minnesota	247,835	------	------	84,344	------	------	146,869	12,564	4,058	------
Missouri	341,204	------	10	94,381	------	37	245,751	124	------	901
Nebraska	159,385	------	------	59,845	------	------	73,222	26,318	------	------
North Dakota	4,134	------	------	219	------	------	------	712	3,203	------
South Dakota	26,697	------	------	7,537	------	------	11,717	7,443	------	------
Total	1,216,265	------	10	293,059	------	37	854,935	60,062	7,261	901

South Atlantic:										
Delaware	18,522	------	------	------	------	------	18,522	------	------	------
District of Columbia	21,969	128	13	1	2,016	6	19,805	------	------	------
Florida	190,801	------	------	------	------	10,281	180,438	------	------	82
Georgia	217,122	------	------	------	------	30,920	186,172	------	------	30
Maryland	97,066	1,577	149	13	11,997	375	82,948	------	------	7
North Carolina	78,419	------	------	------	------	------	78,419	------	------	------
South Carolina	89,894	------	------	------	------	9,390	80,495	------	------	9
Virginia	98,594	------	130	12	10,591	50	87,804	------	------	7
West Virginia	129,692	213	209	17	1,791	21,257	106,170	------	------	35
Total	942,079	1,918	501	43	26,395	72,279	840,773	------	------	170
East South Central:										
Alabama	232,083	------	------	------	------	33,021	188,640	------	------	422
Kentucky	176,924	------	8	1	1,551	1,000	173,256	------	------	1,108
Mississippi	214,543	------	------	------	------	164	213,387	------	------	992
Tennessee	208,044	------	------	------	------	221	206,750	------	------	1,073
Total	831,594	------	8	1	1,551	34,406	792,033	------	------	3,595
West South Central:										
Arkansas	223,022	------	------	30	------	17	222,422	7	------	546
Louisiana	230,133	------	------	------	------	12,265	216,065	------	------	1,803
Oklahoma	18,493	------	------	3,020	------	------	14,881	591	------	1
Texas	80,162	------	------	9	------	8	68,343	10,571	------	1,231
Total	551,810	------	------	3,059	------	12,290	521,711	11,169	------	3,581
Mountain:										
Arizona	154,485	------	------	------	------	------	60,318	94,167	------	------
Colorado	174,712	------	------	52,976	------	------	69,876	51,860	------	------
Idaho	31,797	------	------	------	------	------	650	30,001	1,146	------
Montana	57,366	------	------	6,928	------	------	------	21,133	29,305	------
Nevada	27,989	------	------	------	------	------	7,781	20,016	192	------
New Mexico	45,175	------	------	------	------	------	43,113	2,062	------	------
Utah	72,183	------	------	------	------	------	25	72,158	------	------
Wyoming	6,432	------	------	192	------	------	239	6,001	------	------
Total	570,139	------	------	60,096	------	------	182,002	297,398	30,643	------
Pacific:										
California	1,162,803	------	------	------	------	------	464,269	547,316	151,218	------
Oregon	58,259	------	------	------	------	------	459	21,291	36,509	------
Washington	109,446	------	------	------	------	------	8	253	109,185	------
Total	1,330,508	------	------	------	------	------	464,736	568,860	296,912	------
Total United States	9,806,134	64,536	3,481	505,854	156,274	183,215	7,495,294	941,086	404,686	51,708
Foreign:										
Canada	17,979	------	------	3,288	2	5	14,587	97	------	------
Mexico	8,153	------	------	------	------	------	6,441	1,712	------	------
Total	26,132	------	------	3,288	2	5	21,028	1,809	------	------
Grand total	9,832,266	64,536	3,481	509,142	156,276	183,220	7,516,322	942,895	404,686	51,708

Table 10.—Value of natural gas at the point of consumption in the United States

State by region	Value (thousand dollars)							Average value (cent per Mcf)						
			Industrial							Industrial				
	Residential	Commercial	Field (pumping, drilling, extraction loss and plant fuel)	Carbon black	All other including electric utilities	Total	Total consumption	Residential	Commercial	Field	Carbon black	All other including electric utilities	Total	Total consumption
New England:														
Connecticut	41,387	9,464	------	------	11,775	11,775	62,626	186.2	165.1	----	----	91.6	91.6	153.4
Massachusetts	121,543	26,259	------	------	21,849	21,849	169,651	187.4	161.1	----	----	66.1	66.1	148.5
New Hampshire	4,724	1,264	------	------	610	610	6,598	179.8	157.8	----	----	93.0	93.0	161.6
Rhode Island	16,706	4,011	------	------	3,818	3,818	24,535	186.3	156.2	----	----	79.3	79.3	150.1
Total	184,360	40,998	------	------	38,052	38,052	263,410	186.8	161.4	----	----	74.0	74.0	150.1
Middle Atlantic:														
New Jersey	219,995	27,554	------	------	37,887	37,887	285,436	192.3	136.4	----	----	50.4	50.4	136.1
New York	411,204	106,012	230	------	111,511	111,741	628,957	143.0	122.5	53.1	----	65.6	65.6	115.5
Pennsylvania	293,419	60,564	1,136	------	158,352	159,488	513,471	114.8	89.7	40.8	----	52.2	52.1	81.6
Total	924,618	194,130	1,366	------	307,750	309,116	1,427,864	140.6	111.4	42.5	----	56.1	56.0	103.2
East North Central:														
Illinois	352,919	94,869	1,983	------	110,279	112,262	560,050	103.2	73.5	12.5	----	38.7	37.3	72.5
Indiana	108,777	34,782	3	------	78,132	78,135	221,694	95.1	82.3	13.6	----	38.8	38.8	61.9
Michigan	267,304	71,602	1,962	------	103,171	105,133	444,039	98.6	84.4	37.1	----	52.3	51.9	79.5
Ohio	353,392	95,692	698	------	181,518	182,216	631,300	85.8	75.4	35.0	----	53.6	53.5	71.8
Wisconsin	92,412	22,666	4	------	50,516	50,520	165,598	116.3	96.3	13.8	----	51.8	51.8	82.6
Total	1,174,804	319,611	4,650	------	523,616	528,266	2,022,681	96.4	78.6	20.1	----	46.8	46.2	73.1
West North Central:														
Iowa	71,995	26,112	------	------	47,959	47,959	146,066	93.2	67.5	----	----	36.5	36.5	59.0
Kansas	49,743	15,706	7,774	------	73,610	81,384	146,833	57.3	40.8	26.6	----	23.8	24.0	31.6
Minnesota	91,425	21,957	------	------	46,932	46,932	160,314	105.7	81.7	14.8	----	34.8	34.7	64.5
Missouri	108,895	35,942	------	------	44,032	44,032	188,869	84.1	53.3	----	----	30.5	30.5	55.4
Nebraska	38,897	14,637	607	------	25,753	26,360	79,894	81.7	57.4	15.1	----	28.3	27.8	47.5
North Dakota	5,890	3,150	2,499	------	1,444	3,943	12,983	89.4	63.5	16.4	----	41.1	21.0	42.8
South Dakota	9,798	5,319	1	------	2,724	2,725	17,842	97.1	60.4	11.1	----	33.8	33.7	66.1
Total	376,643	122,823	10,881	------	242,454	253,335	752,801	84.8	58.3	22.3	----	29.5	29.1	49.3

South Atlantic:														
Delaware	9,446	1,895	------	------	5,324	5,324	16,665	165.9	146.0	----	----	48.5	48.5	92.7
District of Columbia	(1)	(1)	------	------	(1)	(1)	(1)	(1)	(1)	----	----	(1)	(1)	(1)
Florida	20,274	14,088	754	------	56,158	56,912	91,274	249.2	110.7	20.0	----	34.3	34.0	48.4
Georgia	69,835	18,257	------	------	42,037	42,037	130,129	104.0	70.1	----	----	35.6	35.6	61.6
Maryland	[1] 97,084	[1] 23,469	4	------	[1] 20,001	[1] 20,005	[1] 140,558	[1] 143.9	[1] 124.7	50.0	----	[1] 72.3	[1] 69.3	[1] 122.1
North Carolina	20,011	8,435	------	------	25,175	25,175	53,621	137.2	116.0	----	----	46.7	46.7	70.8
South Carolina	16,730	6,926	------	------	27,520	27,520	51,176	140.2	98.3	----	----	40.5	40.5	58.9
Virginia	54,389	16,107	19	------	20,266	20,285	90,781	149.8	108.8	38.0	----	45.5	45.5	94.9
West Virginia	42,202	10,165	2,705	------	41,052	43,757	96,124	85.0	70.0	16.2	----	41.8	38.1	53.7
Total	329,971	99,342	3,482	------	237,533	241,015	670,328	126.4	96.9	16.9	----	40.5	39.7	69.1
East South Central:														
Alabama	54,313	17,231	57	------	41,769	41,826	113,370	113.0	53.9	36.5	----	28.0	28.1	49.5
Kentucky	52,065	14,573	2,405	------	30,394	32,799	99,437	81.2	68.3	18.9	----	35.9	33.7	54.4
Mississippi	21,039	7,101	2,615	------	51,227	53,842	81,982	87.3	57.2	17.5	----	25.8	25.2	32.8
Tennessee	33,963	20,011	------	------	42,974	42,974	96,948	91.4	70.7	----	----	31.6	31.6	48.1
Total	161,380	58,916	5,077	------	166,364	171,441	391,737	93.0	62.7	18.2	----	29.3	28.8	45.4
West South Central:														
Arkansas	26,446	12,553	1,676	------	51,926	53,602	92,601	72.5	44.9	11.3	----	25.6	24.7	32.9
Louisiana	44,176	9,659	42,858	3,541	172,699	219,098	272,933	72.4	42.8	17.6	15.9	21.4	20.9	23.6
Oklahoma	49,807	13,774	12,977	------	64,820	77,797	141,378	76.8	50.6	10.6	----	20.9	18.0	28.2
Texas	156,246	43,707	182,959	7,005	370,217	560,181	760,134	85.6	54.2	17.1	13.8	17.6	17.7	21.8
Total	276,675	79,693	240,470	10,546	659,662	910,678	1,267,046	80.2	50.3	16.6	14.4	19.3	18.7	23.4
Mountain:														
Arizona	27,348	10,523	24	------	35,798	35,822	73,693	108.6	54.7	12.6	----	32.6	32.5	47.7
Colorado	44,231	21,305	1,997	------	30,852	32,849	98,385	67.7	54.2	13.1	----	26.4	24.9	41.6
Idaho	6,621	4,493	------	------	8,175	8,175	19,289	135.4	88.8	----	----	34.2	34.2	56.9
Montana	15,539	7,629	546	------	9,551	10,097	33,265	78.1	54.1	8.9	----	31.1	27.4	46.9
Nevada	6,063	2,240	------	------	9,663	9,663	17,966	146.4	93.8	----	------	45.7	45.7	64.9
New Mexico	22,576	6,343	12,696	(2)	24,265	36,961	65,880	93.1	50.5	10.7	----	22.4	16.3	25.0
Utah	22,138	8,645	1,222	------	17,071	18,293	49,076	72.2	55.7	14.1	----	28.6	26.7	42.8
Wyoming	6,909	3,487	3,252	------	5,352	8,604	19,000	64.3	43.4	12.0	----	21.9	16.7	27.0
Total	151,425	64,665	19,737	(2)	140,727	160,464	376,554	81.8	55.6	12.3	----	27.5	23.9	38.7
Pacific:														
Alaska	2,160	2,178	11	------	844	855	6,193	150.3	95.9	----	----	38.2	26.6	76.1
California	468,090	112,188	53,503	(2)	447,041	500,544	1,080,822	95.7	68.6	30.1	----	48.3	45.3	61.5
Oregon	16,643	7,566	------	------	15,937	15,937	40,146	153.2	135.3	20.7	----	40.2	40.2	71.6
Washington	24,555	13,293	------	------	31,208	31,208	69,056	141.2	124.7	20.2	----	39.0	39.0	63.9
Total	511,448	135,225	53,514	(2)	495,030	548,544	1,195,217	98.6	74.3	29.3	----	47.1	44.7	62.0
Total United States:														
1965	4,091,324	1,115,403	[2] 336,107	[2] 13,616	2,811,188	3,160,911	8,367,638	104.8	77.3	17.6	14.6	38.4	29.6	52.2
1964	3,990,464	1,059,250	335,869	14,242	2,620,563	2,970,674	8,020,388	105.9	77.5	16.1	13.4	32.2	28.8	51.9

[1] District of Columbia included with Maryland to avoid disclosure.
[2] 3,070 in value included in "Field" to avoid disclosure; included in "Carbon black" U. S. total.

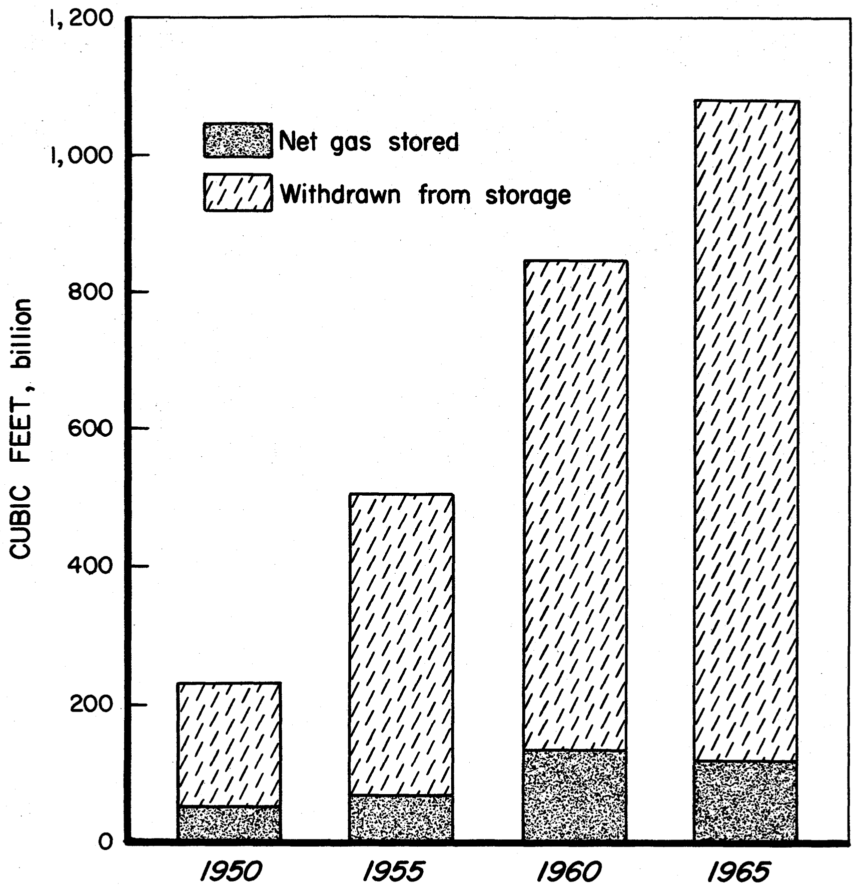


Figure 4.—Trends in net gas stored underground in U.S. storage fields.

Table 11.—Average value of natural gas in the United States

(Cents per thousand cubic feet)

State	At wells (estimated)		At point of consumption	
	1964	1965	1964	1965
Alabama	10.9	12.7	53.6	49.5
Alaska	27.6	24.8	71.7	76.1
Arizona	12.0	12.1	46.0	47.7
Arkansas	15.6	15.6	34.0	32.9
California	30.1	30.9	58.1	61.5
Colorado	11.9	12.9	44.2	41.6
Connecticut	----	----	157.4	153.4
Delaware	----	----	90.7	92.7
District of Columbia	----	----	141.0	138.5
Florida	13.5	12.9	54.7	48.4
Georgia	----	----	63.1	61.6
Idaho	----	----	61.3	56.9
Illinois	11.6	11.7	73.6	72.5
Indiana	23.6	23.6	61.9	61.9
Iowa	----	----	55.3	59.0
Kansas	12.6	13.3	31.3	31.6
Kentucky	23.7	23.6	54.8	54.4
Louisiana	19.1	18.2	23.9	23.6
Maryland	26.7	25.2	128.3	118.3
Massachusetts	----	----	161.9	148.5
Michigan	25.4	25.1	81.4	79.5
Minnesota	----	----	64.3	64.5
Mississippi	17.4	17.3	33.7	32.8
Missouri	24.3	24.5	58.0	55.4
Montana	7.8	8.2	46.0	46.9
Nebraska	15.4	14.6	46.9	47.5
Nevada	----	----	65.4	64.9
New Hampshire	----	----	155.7	161.6
New Jersey	----	----	134.4	136.1
New Mexico	11.7	11.8	25.1	25.0
New York	31.0	30.8	112.2	115.5
North Carolina	----	----	77.2	70.8
North Dakota	22.1	16.0	41.6	42.8
Ohio	23.9	23.6	71.2	71.8
Oklahoma	12.7	13.8	25.7	28.2
Oregon	----	----	73.3	71.6
Pennsylvania	27.3	26.7	82.9	81.6
Rhode Island	----	----	151.5	150.1
South Carolina	----	----	62.7	58.9
South Dakota	----	----	61.9	66.1
Tennessee	19.5	19.0	48.6	48.1
Texas	12.5	12.9	22.8	21.8
Utah	13.7	12.5	42.0	42.8
Virginia	29.9	29.9	96.6	94.9
Washington	----	----	62.3	63.9
West Virginia	25.1	23.5	56.1	53.7
Wisconsin	----	----	83.9	82.6
Wyoming	12.9	13.5	26.5	27.0
Total	15.4	15.6	51.9	52.2

which no commercial quantities of oil or gas had been produced prior to the storage operations. This new trend to aquifer storage developed because of the limited availability of depleted oil or gas fields in the proximity to large consumer areas. Pipeline companies have implemented aquifer storage along their transmission lines to meet fluctuating needs of their system. Of a total of 37 aquifer gas storages in 1965, over 50 percent was centered in Illinois and Indiana.

IMPORTS AND EXPORTS

Imports of 457 billion cubic feet of gas from Canada and Mexico increased 3.3 percent above volumes transported in 1964. Canada provided 70 percent of the imports received in the Pacific Northwest and Midwest market areas.

Exports of gas to Canada and Mexico totaled 26.1 billion cubic feet compared with 19.6 billion in 1964. These volumes supplied spot markets in these countries by the existing U.S. pipeline system from the most feasible sources of supply in Louisiana, Texas, and New Mexico.

VALUE AND PRICE

The average value of natural gas at point of consumption was residential, $1.05; commercial, $0.77; and industrial, $0.30 per Mcf. The average value for total gas consumption was $0.52 per Mcf, and 15.6 cents per Mcf at the wellhead, excluding taxes; for an aggregate value of marketed production of $2.5 billion.

LEGISLATION AND GOVERNMENT PROGRAMS

DOMESTIC

Permian Basin Decision.—The Federal Power Commission (FPC) August 5, 1965, decision fixed gas producer rates for interstate sales for resale in 3 of its 23 pricing areas.[4] These three areas include the southeast corner of New Mexico and southwestern Texas and supply 10 percent of the Nation's natural gas. The dual price system was based on national costs, including a 12-percent rate of return. The Commission set the following ceiling prices: 16.5 cents per Mcf for new gas well gas, nonassociated gas placed under contract since January 1, 1961, in the Texas portion of the Permian Basin; 14.5 cents per Mcf for pre-1961 gas including gas well gas, oil well gas, and residue gas in Texas (including production taxes); 15.5 cents per Mcf for new gas well gas in New Mexico plus production taxes, and for all pre-1961 gas in New Mexico, 13.5 cents per Mcf which includes gas well gas, oil well gas, and residue gas in New Mexico.

The Commission also set a minimum rate of 9 cents per Mcf for Permian gas of

[4] Oil and Gas Journal. V. 63, No. 32, Aug. 9, 1965, pp. 51–55.

Table 12.—Gas wells and condensate wells in the United States

State	Completed during 1964 [1]	Producing Dec. 31, 1964	Completed during 1965 [1]	Producing Dec. 31, 1965
Alabama	-----	-----	-----	-----
Alaska	2	13	13	11
Arizona	6	10	-----	8
Arkansas	48	515	44	744
California	123	950	62	1,033
Colorado	70	560	53	701
Illinois	17	25	8	25
Indiana	2	280	10	275
Kansas	219	7,174	206	7,200
Kentucky	194	5,320	177	6,100
Louisiana	538	8,260	542	8,563
Maryland	-----	16	1	20
Michigan	53	195	36	226
Mississippi	18	435	15	370
Missouri	-----	6	---	11
Montana	16	869	10	784
Nebraska	2	41	1	39
New Mexico	340	7,306	303	8,010
New York	45	1,155	18	1,150
North Dakota	-----	31	-----	31
Ohio	288	7,160	263	7,100
Oklahoma	464	6,813	549	7,447
Pennsylvania	358	14,120	286	17,516
Tennessee	-----	30	3	20
Texas	1,328	22,995	1,343	23,748
Utah	19	135	27	148
Virginia	2	100	1	99
West Virginia	652	17,960	695	19,600
Wyoming	51	610	58	701
Total	4,855	103,084	4,724	111,680

[1] Source: Oil and Gas Journal.

standard quality. The ceilings set by FPC apply only to the 336 producers who were parties to the Permian proceeding instituted in 1960. The new prices will apply to all gas dedicated to the interstate market while applicable area prices are in effect. The FPC decision was expected to result in producer refunds of $33.6 million in excessive rates collected since 1957.

FOREIGN

Italy.—The Italian Government is striving to find new sources of natural gas energy to meet increasing demand in face of declining gas resources in the Po Valley. In an attempt to maintain its present gas consumption pattern and to provide market expansion in consumption, the Government signed an agreement in 1965 with Esso International, Inc., to import Libyan LNG as their primary gas source. A few gas discoveries were made in Sicily and southern Italy in 1965, but they were not of sufficient magnitude to improve the country's dwindling gas reserves.

The Ministry of Industry and Trade introduced in Parliament a bill providing for the exploration and drilling for liquid and gaseous hydrocarbons in Italian coastal waters of the Adriatic and Mediterranean Seas. Ente Nazional Idrocarbui (ENI) has stressed the need for this bill to revise the 1957 search law relative to onshore exploration, particularly the limits of size, duration, and royalty rates and in relationship to proposals for offshore work which would make exploration more attractive to private companies. ENI has also requested permission to form joint ventures for large-scale exploration with Italian or foreign private firms to implement the State Agency's 1965–69 exploration program representing expenditures of around 250,000 million lire (U.S. $400 million) during the period, including 170,000 million lire (US.$272 million) abroad.

Netherlands.—In September 1965 the Dutch North Sea Act was passed; this gives the Government the right to acquire up to 50-percent interest in any commercial petroleum discovery. Under the act the Government would pay the operator only for its share of the cost of drilling the discovery well, giving no consideration to dry hole costs, survey work, lease bonuses and rentals. Also included in the Government's share of profits would be royalty payments and corporate taxes, which would account for more than half of a participating company's remaining share of profits.[5]

[5] Oil and Gas Journal. V. 64, No. 26, June 27, 1966, pp. 107–108.

Table 13.—Production of natural gas liquids at natural gas processing plants, and disposition of residue gas in the United States in 1964–65, by States

State	Total natural gas liquids and ethane production (thousand gallons)	Natural gas processed	Extraction loss (shrinkage)	Disposition of residue gas					Total residue gas
				Used at plants	Returned to formation	Vented or flared	Pipeline		
							Returned to producer	To other companies	
1964:									
Arkansas	91,698	127,167	4,069	3,586	20,302	40	325	98,845	123,098
California	1,072,987	529,359	36,769	32,920	182,201	294	80,232	196,943	492,590
Colorado	141,316	117,270	5,526	4,040	27,487	243	10,674	69,300	111,744
Kansas	675,472	799,761	21,358	6,880	-------	147	248,337	523,039	778,403
Kentucky [1, 2]	552,915	488,210	28,345	993	123	200	194,237	264,312	459,865
Louisiana	2,600,464	2,829,286	64,473	44,224	179,599	258	157,847	2,382,885	2,764,813
Michigan	65,066	114,265	1,577	2,253	-------	274	13	110,148	112,688
Mississippi	50,762	82,325	1,826	2,171	23,213	36	9,625	45,454	80,499
Montana [3]	101,842	52,667	3,798	4,053	16,371	172	3,059	25,214	48,869
Nebraska	34,143	10,337	1,767	549	11	-------	4,276	3,734	8,570
New Mexico	1,095,237	722,424	47,840	37,341	12,422	4,028	107,214	513,579	674,584
North Dakota	105,706	32,188	5,378	4,289	-------	353	4,416	17,752	26,810
Oklahoma	1,434,857	895,038	52,883	43,913	60,711	1,305	81,310	654,916	842,155
Pennsylvania	2,619	2,137	114	13	50	-------	801	1,159	2,023
Texas	9,033,696	5,856,166	417,042	257,495	871,180	18,186	784,098	3,508,165	5,439,124
West Virginia [4]	445,207	329,854	17,022	5,073	r -------	-------	r 126,226	181,533	312,832
Wyoming	239,785	187,672	8,853	6,945	r 13,363	20	r 12,412	146,079	178,819
Total	17,743,772	13,176,126	718,640	456,738	r 1,407,033	25,556	r 1,825,102	8,743,057	12,457,486
1965:									
Arkansas	97,539	120,499	4,602	3,842	17,979	32	357	93,687	115,897
California	994,862	516,232	35,943	32,415	168,991	284	103,303	175,296	480,289
Colorado	145,579	133,640	5,251	4,426	20,859	5	12,176	90,923	128,389
Kansas	740,901	819,390	19,635	7,046	-------	60	220,642	572,007	799,755
Kentucky [1, 2]	598,117	529,000	36,740	4,430	-------	-------	439,096	48,734	492,260
Louisiana	2,731,874	2,870,052	72,437	48,335	159,866	1,201	150,238	2,437,975	2,797,615
Michigan	85,353	130,342	2,827	1,841	5,242	-------	12	120,420	127,515
Mississippi	48,732	64,809	1,498	2,217	20,630	164	8,401	31,899	63,311
Montana [3]	92,554	41,053	2,985	3,888	8,741	26	2,964	22,449	38,068
Nebraska	24,768	11,905	1,541	586	115	-------	2,821	6,842	10,364
New Mexico	1,117,798	858,756	37,533	39,038	13,204	11,905	123,237	633,839	821,223
North Dakota	106,233	39,775	5,927	5,294	-------	1,629	19,670	7,255	33,848
Oklahoma	1,464,794	920,391	46,083	40,437	45,698	2,064	101,502	684,607	874,308
Pennsylvania	2,705	1,686	119	9	52	-------	27	1,479	1,567
Texas	9,620,072	6,201,909	454,545	270,793	830,758	20,168	966,132	3,659,513	5,747,364
West Virginia [4]	435,032	324,337	16,007	1,618	-------	-------	125,546	181,166	308,330
Wyoming	238,424	188,325	9,800	7,324	18,595	1,754	12,775	138,077	178,525
Total	18,545,337	13,772,101	753,473	473,539	1,310,730	39,292	2,288,899	8,906,168	13,018,628

r Revised.
[1] Includes gas from transmission lines previously processed in another State.
[2] Illinois included with Kentucky.
[3] Utah included with Montana.
[4] Florida included with West Virginia.

The 30 oil companies that have been reported to be interested in acquiring licenses for exploration are taking a close second look at operations in Netherlands waters in view of the poor profit picture in comparison to similar ventures off other North Sea countries.

The United Kingdom and West Germany have already issued exploration and production licenses in the North Sea, and drilling is underway; however, the Government of the Netherlands has failed to pass the necessary legislation or issue licenses. While the Netherlands hesitate, other nations are developing their resources and the potential outlet markets for Netherland gas are shrinking. The longer the Netherlands delay, the less attractive their North Sea province becomes under the present laws.

United Kingdom.—In May 1964, the British Government passed legislation to govern petroleum regulations for operations in the North Sea. Under the U.K. Petroleum (Production) (Continental Shelf and Territorial Seas) Regulations, two kinds of licenses were established.[6] One, a 3-year nonexclusive exploration license, is limited to preliminary exploratory work and restricts depth of well drilling for such purposes. The other license, the production license, is exclusive and permits the drilling and production of oil or gas. Both licenses are only issued to British national residents, or to companies incorporated in the United Kingdom.

One of the U.K. offshore areas designated in accordance with the terms of the Continental Shelf Convention of 1958 covers 100,000 square miles and is gridded into blocks of about 100 square miles. The blocks are bounded by lines of latitude and longitude except where they are near the coast, where they are of irregular shape. Operators may apply for any number of licenses. Licensees have the right to the original license area for 6 years and an option on not more than half the original area for a further 40 years.

WORLD PRODUCTION

In 1965 the United States, U.S.S.R., Canada, and Mexico were the leading countries in world marketed production of natural gas. The relative growth for the period 1961–65 is presented on logarithmic scale in figure 5. The Netherlands recorded the largest gain over the previous year, 59 percent, an increase of 32 billion cubic feet. Both Algeria and Nigeria experienced a 54-percent yearly increase in marketed gas production in 1965.

Recent offshore discoveries in the British section of the North Sea have assured the United Kingdom substantial resources of indigenous low-cost energy for the first time, which will provide lower production costs for many industries, and will eventually have an effect on the energy patterns of the United Kingdom and some of the surrounding countries. Exploration and development drilling progressed slowly in 1965, but they probably will be expanded during 1966 when equipment becomes more available and the discovery structures delineated. The largest reported British North Sea discovery was a 1965 wildcat of Shell-Esso on block 49/26, which in early 1966 produced gas in commercial quantities. The companies have not divulged the size of the structure; however, production potential estimates range from 1,400 to 3,000 million cubic feet per day.

This and other offshore developments in the U.K. North Sea search are encouraging to the U.K. future supply and demand fuel situation. At present around 1 billion cubic feet of town gas is consumed daily, and it is reasonable to assume that natural gas would, based upon present discoveries, supply this daily requirement. However, several years lead time would be required to develop adequate production and distribution systems to replace the town gas supply.

WORLD REVIEW

Netherlands.—Netherlands' known proved natural gas reserves of 40.9 trillion cubic feet at the end of 1965 ranks it as the leading European and one of the major worldwide natural gas areas. These proved reserves will support Netherlands gas produc-

[6] Petroleum Times. V. 71, No. 1788, Feb. 18, 1966, pp. 243–244.

Table 14.—Marketed production of natural gas by countries at 60° F (15.56° C) and normal atmospheric pressure [1]

(Million cubic feet)

Country [1]	1961	1962	1963	1964	1965 p
North America:					
Barbados	109	120	128	94	102
Canada	655,738	r 946,703	r 1,111,478	r 1,317,718	1,324,149
Mexico [2]	381,027	r 392,444	r 423,371	r 485,044	493,157
Trinidad	29,375	30,018	r 29,365	r 38,452	52,710
United States	13,254,025	13,876,622	14,746,663	r 15,462,667	16,039,753
South America:					
Argentina	87,937	110,090	125,564	r 139,987	NA
Brazil [2]	19,663	19,082	r 18,801	19,844	25,495
Chile [2]	95,120	132,844	192,402	235,166	231,931
Colombia	16,950	22,398	21,725	29,452	14,492
Peru	33,710	35,151	37,353	45,134	44,335
Venezuela	200,184	214,254	230,190	250,902	264,002
Europe:					
Austria	58,073	61,013	63,406	65,827	64,329
Czechoslovakia	167,977	187,533	r 206,939	215,859	228,809
France	151,951	176,886	r 181,375	r 189,623	190,369
Germany, West	17,960	23,007	34,148	54,368	82,878
Hungary [2]	12,078	12,692	22,834	29,250	41,323
Italy	256,116	266,860	271,227	286,778	291,187
Netherlands (deliveries)	r 15,450	r 16,981	r 20,041	r 28,550	60,496
Poland	26,956	29,531	35,275	45,930	51,431
Rumania	268,603	329,805	376,970	426,073	480,179
U.S.S.R.	2,272,788	2,806,464	3,414,780	r 4,051,683	4,814,280
United Kingdom	106	115	153	172	NA
Yugoslavia	2,566	3,557	7,131	10,224	12,317
Africa:					
Algeria (Sahara)	8,615	13,189	r 14,902	r 29,994	65,038
Gabon, Republic of	249	328	321	353	386
Morocco	r 339	r 369	r 436	r 443	425
Nigeria [2]	r 10,943	r 17,179	22,106	36,333	79,438
Tunisia	259	262	272	293	301
Asia:					
Brunei	3,005	2,990	r 7,390	6,460	e 7,500
Burma [2]	560	672	597	NA	NA
Indonesia [2]	95,577	101,212	104,421	NA	NA
Iran	104,221	107,161	108,511	122,485	123,682
Iraq	23,773	NA	NA	NA	NA
Israel	r 99	r 284	r 366	1,069	2,705
Japan [2]	35,464	45,122	63,243	69,368	43,964
Kuwait	43,972	65,867	72,305	71,076	68,314
Pakistan	34,665	42,076	49,459	59,100	67,000
Taiwan	1,383	1,433	1,890	6,322	11,557
Oceania:					
Australia	12	56	96	106	144
New Zealand	5	4	3	5	5

e Estimate. p Preliminary. r Revised. NA Not available.

[1] Natural gas is produced in China, mainland, Ecuador, and India, but there is no recent information available.

[2] Total production.

NOTE: The data relate, as far as possible to natural gas actually collected and utilized as fuel or raw material. They exclude gas used for repressuring, as well as gas flared, vented, or otherwise wasted, whether or not it has first been processed for the extraction of natural gasoline.

For countries reporting in the metric system, the following conversion factor will be used:

$$m^3 \text{ at } 32° F\ (0° C) \times 37.32 = ft^3 \text{ at } 60° F$$
$$(ft^3 \text{ at } 60° F \times 0.026795 = m^3 \text{ at } 32° F).$$

tion of over 1 trillion cubic feet per year for the next 35 to 40 years, based on an anticipated gas demand of ultimately 500 billion cubic feet per year, permitting an equal volume of natural gas for export.[7]

The 1959 gas discoveries in the northeastern portion of the Netherlands in Groningen Province have been further developed and defined and at yearend totaled 39.0 trillion cubic feet. Intensive exploration for natural gas has been in progress also in other parts of the country, particularly in the northwest. The composition of the average Groningen gas shows it to be lean with a content of 82 percent methane and 2.7 percent ethane, while the remaining 15 percent consists of 14.0 percent nitrogen and 1.0 percent carbon dioxide, with a trace of helium. Gross heating value

[7] American Gas Journal. V. 193, No. 7, June 1966, p. 52.

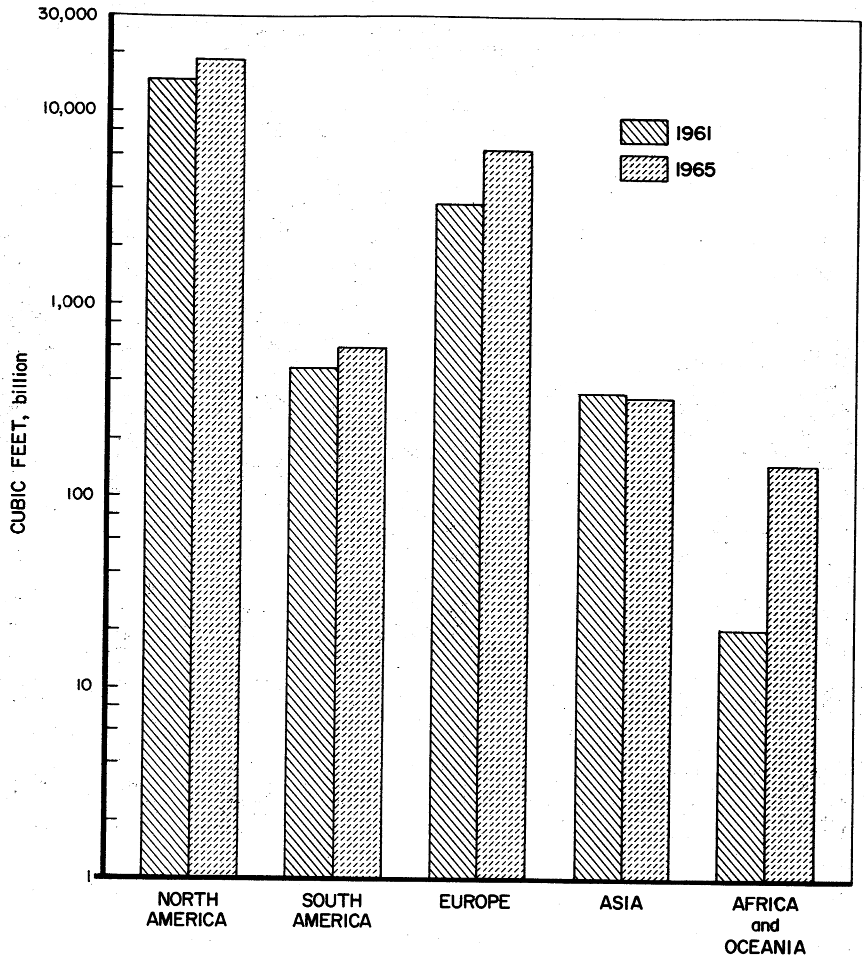


Figure 5.—World marketed production of natural gas, 1961–65

of the gas is 890 British thermal units (Btu) per standard cubic foot of gas.

France.—The new French prototype tanker, the *Pythagore,* a 185-foot, small-scale, prototype, refrigerated tanker with a cargo tank volume of 21,200 cubic feet has completed several trial transocean shipments of liquid hydrocarbons.[8] This unique French-developed ocean transport technique of Gazocean of Paris is based on a light hull-hugging container of waffled steel plates, 1 millimeter thick instead of the conventional massive pressure vessel-type tank used in the 100 or so refrigerated oceangoing tankers now in operation.

The key to this integrated tank technique is an assembly of corrugated, thin, low-carbon, stainless steel plates that are lapwelded together to form a steel membrane which follows the shape of the hull closely, utilizing the ship's hull for support, and providing much greater cargo capacity. Building costs are estimated to be 20 percent cheaper than the conventional self-supporting tank design, because the volume of cyrogenic alloy required for structural strength and tightness is reduced. Membrane tanks can be cooled quicker and easier, hold more cargo per unit size, and reduce boil off because of the reduction in metals. Cost reduction in tanker construction and operation will enable shipments of LNG to become more competitively priced in far-off markets and bring the natural gas liquefaction process within economic reach of small, developing countries rich in natural gas but unable to develop such resources because of remoteness to markets.

For example, the competitive cost of gas in the United Kingdom is 50 to 55 cents per million Btu. Developers of the Pythagore claim a tanker of 40,000-cubic-meter capacity is required to obtain basic economies inherent in this design which could transport LNG from Venezuela to the United Kingdom for about 28 cents per million Btu.

United Kingdom.—The discovery of natural gas in the North Sea by the British Petroleum Co. 46 miles off the Eastern Coast was the key gas British development in 1965.[9] This discovery was responsible for the request for 137 production licenses which brought the number of total production permits in the North Sea to 90 and nonexclusive exploration licenses to 17.

Early in 1966, The British Petroleum Co. and the British Gas Council agreed on a 3-year contract for 100 Mcf per day for 6 to 7 cents per Mcf; and for at least 50 Mcf per day to be supplied for 15 years at a negotiated price as well as that for any other North Sea production. In the spring of 1966; The British Petroleum Co. plans to construct a 16-inch $13.5 million submarine pipeline from the area to the coast with a capacity of 200 million cubic feet per day.

Italy and Spain.—In November 1965, Jersey Standard Oil Company signed 20- and 15-year contracts with Italy's ENI and Catalona de Gas of Spain for a continuation of the uptrend in tanker movements of LNG.[10] Italy will be delivered an average of 235 million cubic feet per day and Spain 110 million cubic feet per day. Jersey will construct a huge liquefaction plant at its Marsa el Brego Libyan Coast terminal and a gasification plant at La Spezzia in Italy and Barcelona, Spain. It is reported the price for the gas will be below that for Algerian gas landed in United Kingdom or France.

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[8] Page 41 of work cited in footnote 7.

[9] World Petroleum. V. 12, Mar. 15, 1966, p. 146.

[10] Oil and Gas Journal. V. 63, No. 46, Nov. 15, 1965, p. 143.

Natural Gas Liquids

By William B. Harper [1] and Leonard L. Fanelli [2]

Contents

GENERAL SUMMARY

Reflecting the continued growth in the demand for natural gas, production of natural gas liquids in 1965 totaled 18,545 million gallons, exceeding the production of the preceding year by 4.5 percent and establishing a new peak. Natural gas liquids are products obtained from natural gasoline plants, cycling plants, and fractionators after separating the natural gas. Included in these products are ethane, the liquefied petroleum gases propane, butane, and propane-butane mixtures; isobutane and other mixed gases. Also included in the output of these plants are the natural gasolines, plant condensate and finished products such as gasolines, special naphthas, jet fuel, kerosine, distillate fuel oil, and other finished products.

The total value of the natural gas liquids at plants in 1965 was $911,603,000, an increase of $85,211,000 or 10.3 percent. The average value per gallon produced was 4.9 cents, as compared with 4.7 cents in 1964.

Shipments of liquefied petroleum gases and ethane for fuel and chemical uses totaled 12,897,000 gallons in 1965, an increase of 3.6 percent for the year. Natural gas liquids used as blending material in motor fuel (excluding finished gasoline and naphtha) totaled 9,442 million gallons in 1965 as compared with 8,977 million in 1964, a gain of 5.2 percent.

SCOPE OF REPORT

Statistics on natural gas liquids are collected by the Bureau of Mines from reports submitted by natural gasoline plants, cycling plants, and fractionators that handle natural gas liquids. Information on production, stocks, and distribution is obtained from monthly reports. Annual reports provide data on type of plant, production, value of production, and volume of gas processed. Reports submitted to the Bureau include all natural gas liquids except the small volume recovered at pipeline compressor stations and gas dehydration plants. Such recovery is considered to be of little significance in the national and State totals. Plant condensate is included in the category of natural gas liquids. Field condensate, however, is reported with crude oil and is excluded from the total for natural gas liquids. Liquid refinery gases and ethane produced at petroleum refineries are not natural gas liquids, but to obtain complete distribution information on liquefied gases, the sales data shown in this chapter cover the products of natural gasoline plants and petroleum refineries.

Data on shipments of liquefied petroleum gases are collected by the Bureau of Mines from annual reports received from all pro-

[1] Mineral specialist (petroleum), Division of Petroleum.
[2] Survey statistician, Division of Statistics.

ducers and distributors and from most of the dealers that sell more than 100,000 gallons of LP gases annually. The reported sample of dealer shipments is expanded by Petroleum Administration for Defense (PAD) districts on the basis of the domestic demand in the districts.

Data on shipments of LP gases used as fuels or chemicals include data on ethane and liquefied gas produced at natural gasoline plants and at petroleum refineries; they exclude however, data on LP gases blended into motor fuel.

Liquefied gases and ethane, whether obtained from natural gas or from processing in refineries, are defined as follows:

Ethane.—Includes all ethane, ethylene, and mixtures containing more than 50 percent of either.

Propane.—Includes all products covered by Natural Gas Processors Association (NGPA) specifications for commercial propane.

Butane-propane.—Includes all products covered by NGPA specifications for commercial butane-propane mixtures.

Butanes.—Includes all products covered by NGPA specifications for commercial butane, except those that contain 60 percent or more isobutane.

Isobutane.—Includes all products covered by NGPA specifications for commercial butane that contain 60 percent or more isobutane.

Other mixtures of liquefied petroleum gases.—Includes mixtures that cannot be classified within the five classifications mentioned, such as mixtures containing less than 50 percent ethane but more than 50 percent propane and butane.

DISTRICTS

The Bureau reports the production of natural gas liquids by States. Louisiana and Texas are also reported by districts.

Louisiana is divided into an Inland district and a Gulf Coast district. The Gulf Coast district includes Vernon, Rapides, Avoyelles, Pointe Coupee, West Feliciana, East Feliciana, Tangipahoa, St. Helena, and Washington Parishes (counties) and all parishes in the State south of these. All parishes not included in the Gulf Coast district are in the Inland district.

The Bureau of Mines producing districts in Texas correspond, with one exception, to groupings of the Texas Railroad Commission districts:

Bureau of Mines districts	*Railroad Commission district*
Gulf Coast	Nos. 2 and 3
West Texas	Nos. 7C, 8 and 8A
East Proper	Part of No. 6 (East Texas field in Cherokee, Smith, Upshur, Rush, and Gregg Counties)
Panhandle	No. 10
Rest of State:	
North	Nos. 7B and 9
Central	No. 1
South	No. 4
Other East Texas	Nos. 5 and 6 (exclusive of East Proper)

Refineries are also grouped by the Bureau of Mines into a set of refining districts. These refining districts may be combined to correspond with the grouping originated during World War II by the Petroleum Administration for War, called PAW districts (later changed to PAD districts).

PAD district	*Refining district*
1	*East Coast*—District of Columbia, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, the following counties of New York: Cayuga, Tompkins, Chemung, and all counties east and north thereof, and the following counties of Pennsylvania: Bradford, Sullivan, Columbia, Montour, Northumberland, Dauphin, York, and all counties east thereof.
1	*Appalachian No. 1*—West Virginia and those parts of Pennsylvania and New York not included in the East Coast district.

2__*Appalachian No. 2.*—The following counties of Ohio: Erie, Huron, Crawford, Marion, Delaware, Franklin, Pickaway, Ross, Pike, Scioto, and all counties east thereof.

2__*Indiana-Illinois-Kentucky* — Indiana, Illinois, Kentucky, Tennessee, Michigan, and that part of Ohio not included in the Appalachian district.

2__*Oklahoma-Kansas-Missouri*—Oklahoma, Kansas, Missouri, Nebraska, and Iowa.

2__*Minnesota-Wisconsin-North Dakota-South Dakota* — Minnesota, Wisconsin, North Dakota, and South Dakota.

3__*Texas Inland.*—Texas, except Texas Gulf Coast district.

3__*Texas Gulf Coast*—The following counties of Texas: Newton, Orange, Jefferson, Jasper, Tyler, Hardin, Liberty, Chambers, Polk, San Jacinto, Montgomery, Harris, Galveston, Waller, Fort Bend, Brazoria, Wharton, Matagorda, Jackson, Victoria, Calhoun, Refugio, Aransas, San Patricio, Nueces, Kleberg, Kenedy, Willacy, and Cameron.

3__*Louisiana Gulf Coast*—The following parishes of Louisiana: Vernon, Rapides, Avoyelles, Pointe Coupee, West Feliciana, East Feliciana, Tangipahoa, St. Helena, Washington, and all parishes south thereof; the following counties of Mississippi: Pearl River, Stone, George Hancock, Harrison, and Jackson; and Mobile and Baldwin Counties, Alabama.

3__*North Louisiana-Arkansas*—Arkansas and those parts of Louisiana, Mississippi, and Alabama not included in the Louisiana Gulf Coast district.

3__*New Mexico.*—New Mexico.

4__*Rocky Mountain* — Montana, Idaho, Wyoming, Utah, and Colorado.

5__*West Coast*—Washington, Oregon, California, Nevada, Alaska, Arizona, and Hawaii.

Some data in this chapter are based on the Bureau of Mines refining districts, while others refer to the PAD districts. Maps showing the PAD and Bureau of Mines refining districts appear in figure 2 of the Crude Petroleum and Petroleum Products chapter of the Bureau of Mines Minerals Yearbook.

RESERVES

Proved reserves of natural gas liquids in the United States totaled 8,024 million barrels as of December 31, 1965, according to estimates of the Committee on Natural Gas Reserves of the American Gas Association. Compared with 1964, there was a net increase in reserves of 277 million barrels for the year. Although there were net decreases in the reserves of 13 of the 21 States which are reported by the Committee, gains in the reserves in Louisiana, Oklahoma, Texas, Ohio, and West Virginia more than offset declines in other large oil and gas producing States such as California, Kansas, Mississippi, New Mexico, and Utah.

PRODUCTION

Production of natural gas liquids rose for the eighth consecutive year, continuing an uptrend which began in 1959. The production in 1965 aggregated 18,545 million gallons, topping the preceding year by nearly 802 million gallons, or 4.5 percent. Production of the liquefied petroleum gases and ethane, moreover, has been rising at a faster rate than has natural gasoline. This is readily understandable since improved processing methods, coupled with a strong demand providing an incentive to maximize yields of the liquefied petroleum gases and the ethane as well as the finished products from the liquids, has resulted in an increase in the production of these

Table 1.—Production, stock change, and shipments of natural gas liquids and liquefied refinery gases in the United States

(Thousand gallons)

	Production		Net change in stocks [1]		Deliveries to refineries		Shipments for fuel and chemical use	
	1964	1965	1964	1965	1964	1965	1964	1965
Natural gas liquids, total	17,743,772	18,545,337	61,475	44,528	8,976,736	9,441,716	8,705,561	9,059,093
Ethane	984,287	1,115,834	383	2,002	---------	---------	983,904	1,113,832
Liquefied gases, total	9,759,304	10,141,433	72,612	27,731	2,706,606	2,818,284	[2] 6,980,086	[2] 7,295,418
Propane	5,446,395	5,707,503	(21,096)	(122,742)	99,540	75,348	5,367,951	5,754,897
Butanes	2,456,710	2,607,003	72,790	104,753	1,595,188	1,663,972	788,732	838,278
Butane-propane mixture	460,388	375,136	10,655	(18,459)	70,014	80,220	379,719	313,375
Isobutane	957,646	1,029,298	35,900	67,514	903,896	961,784	17,850	---------
Other mix	438,165	422,493	(25,637)	(3,335)	37,968	36,960	425,834	388,868
Isopentane	94,745	101,523	528	(718)	94,217	102,241	---------	---------
Natural gasoline, total	5,191,958	5,355,844	(1,525)	32,413	5,193,483	5,323,431	---------	---------
12 pounds and less	2,049,249	2,021,290	(12,629)	19,946	2,061,878	2,001,344	---------	---------
Over 12 pounds including 14 pounds	654,350	753,627	7,958	3,875	646,392	749,752	---------	---------
Over 14 pounds including 18 pounds	557,619	554,292	837	180	556,782	554,112	---------	---------
Over 18 pounds including 22 pounds	92,589	102,051	56	40	92,533	102,011	---------	---------
Over 22 pounds including 26 pounds	499,179	561,834	225	764	498,954	561,070	---------	---------
Over 26 pounds	1,338,972	1,362,750	2,028	7,608	1,336,944	1,355,142	---------	---------
Plant condensate	981,188	1,198,477	(1,242)	717	982,430	1,197,760	---------	---------
Finished and other, total	732,290	632,226	(9,281)	(17,617)	---------	---------	741,571	649,843
Finished gasoline	495,456	434,006	(4,414)	(13,646)	---------	---------	499,870	447,652
Special naphthas	11,049	5,261	(115)	(40)	---------	---------	11,164	5,301
Jet fuel	14,453	4,566	(2,920)	(122)	---------	---------	17,373	4,688
Kerosine	60,593	51,326	(2,088)	(3,560)	---------	---------	62,681	54,886
Distillate fuel oil	16,626	14,775	151	(268)	---------	---------	16,475	15,043
Other	134,113	122,292	105	19	---------	---------	134,008	122,273
Liquefied refinery gases, total	4,473,504	4,487,112	(8,148)	(1,134)	---------	---------	4,481,652	4,488,246
For fuel:								
Liquefied gases, total [3]	2,488,248	2,357,250	(11,424)	(10,836)	---------	---------	2,499,672	2,368,086
Propane	2,006,046	1,931,874	(2,982)	(10,332)	---------	---------	2,009,028	1,942,206
Butanes	352,296	268,506	(6,342)	(2,394)	---------	---------	358,638	270,900
Butane-propane mixture	88,116	99,414	(1,638)	378	---------	---------	89,754	99,036
Isobutane	---------	---------	---------	---------	---------	---------	---------	---------
Other mix	41,790	57,456	(462)	1,512	---------	---------	42,252	55,944
For petrochemical feedstocks:								
Ethane-ethylene	353,304	379,470	(2,814)	8,190	---------	---------	356,118	371,280
Liquefied gases, total [3]	1,631,952	1,750,392	6,090	1,512	---------	---------	1,625,862	1,748,880
Propane	433,524	537,894	1,008	1,890	---------	---------	432,516	536,004
Butanes	358,428	198,870	924	126	---------	---------	357,504	198,744
Butane-propane mixture	5,754	120,582	---------	---------	---------	---------	5,754	120,582
Isobutane	13,650	21,546	(1,470)	1,470	---------	---------	15,120	20,076
Other mix	820,596	871,500	5,628	(1,974)	---------	---------	814,968	873,474
Total ethane and LP gases	15,217,095	15,744,379	64,847	28,599	2,706,606	2,818,284	12,445,642	12,897,496
Total all products	22,217,276	23,032,449	53,327	43,394	8,976,736	9,441,716	13,187,213	13,547,339

[1] Numbers in parentheses indicate decrease in stock.
[2] In addition 196,879 thousand gallons were imported in 1964, and 317,226 thousand gallons in 1965.
[3] Propane includes propylene; butane includes butylene.

Table 2.—Estimated proved recoverable reserves of natural gas liquids [1] in the United States

(Thousand barrels)

State	Reserves as of Dec. 31 1964	Changes in reserves during 1965: Extensions and revisions	Discoveries of new fields and new pools	Net production	Reserves as of December 31, 1965: Nonassociated with oil	Associated with oil	Dissolved in oil	Total
Arkansas	19,010	—2,991	480	1,743	10,994	1,284	2,478	14,756
California [2]	272,964	12,221	2,100	24,483	9,857	79,454	173,491	262,802
Colorado	25,728	840	130	3,030	4,908	1,936	16,824	23,668
Illinois	3,171	413	4	576	6	0	3,006	3,012
Indiana	91	12	------	18	3	3	79	85
Kansas	209,986	489	653	10,811	190,927	6,679	2,711	200,317
Kentucky	53,458	3,193	1,597	3,632	[3] 54,616	-------	-------	54,616
Louisiana [2]	1,941,500	344,877	26,194	143,769	1,870,817	227,692	70,293	2,168,802
Michigan	5,861	—321	203	827	1,565	1,139	2,212	4,916
Mississippi	32,875	—3,911	318	2,268	12,270	12,296	2,448	27,014
Montana	12,972	—2,402	------	582	2,498	-------	7,490	9,988
Nebraska	3,111	946	------	393	1,492	353	1,819	3,664
New Mexico	576,596	—3,304	1,830	32,291	375,416	45,421	121,994	542,831
North Dakota	67,140	1,577	------	2,577	-------	19,322	46,818	66,140
Ohio	1,134	667	------	301	[3] 1,500	-------	-------	1,500
Oklahoma	342,902	42,181	5,251	32,037	201,330	58,628	98,339	358,297
Pennsylvania	1,378	------	------	67	1,311	-------	-------	1,311
Texas [2]	3,959,788	312,714	65,947	278,892	2,180,051	669,281	1,210,225	4,059,557
Utah	54,657	—1,595	------	1,704	616	20,000	30,742	51,358
West Virginia	69,774	8,625	4,313	7,704	[3] 75,008	-------	-------	75,008
Wyoming	92,536	7,374	1,687	7,705	46,339	1,662	45,891	93,892
Total	7,746,632	721,605	110,707	555,410	5,041,524	1,145,150	1,836,860	8,023,534

[1] Comprises natural gasoline, LP gases and condensate.
[2] Includes offshore reserves.
[3] Not allocated by types but occurring principally in column shown.

Source: Committee on Natural Gas Reserves, American Gas Association.

Table 3.—Natural gas liquids and ethane produced, value at plants in the United States in 1965, by States

State	Number of operators [2]	Natural gasoline [1]			LP Gases and ethane			Condensate		
		Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon
Arkansas	5	26,360	1,502	5.7	69,752	3,139	4.5	--------	------	--
California	19	627,267	47,455	7.6	339,082	15,467	4.6	28,513	2,395	8.4
Colorado	6	54,180	3,034	5.6	91,399	3,930	4.3	--------	------	--
Kansas	11	148,050	7,551	5.1	587,416	22,322	3.8	5,015	211	4.2
Kentucky [3]	5	29,291	2,113	7.2	568,517	25,796	4.5	309	22	7.2
Louisiana	39	697,260	46,716	6.7	1,300,038	46,101	3.6	329,081	24,023	7.3
Michigan	5	9,054	607	6.7	76,299	3,815	5.0	--------	------	--
Mississippi	5	23,625	1,418	6.0	22,150	975	4.4	2,588	163	6.3
Montana [4]	7	26,718	1,628	6.1	65,836	2,130	3.2	--------	------	--
Nebraska	3	7,822	516	6.6	16,946	847	5.0	--------	------	--
New Mexico	15	349,402	20,265	5.8	759,311	25,817	3.4	716	48	6.7
North Dakota	3	20,608	1,236	6.0	85,174	3,066	3.6	451	27	6.0
Oklahoma	42	498,298	29,898	6.0	894,665	32,208	3.6	68,940	4,481	6.5
Pennsylvania	3	1,022	55	6.6	1,683	109	6.5	--------	------	--
Texas	78	2,809,818	188,258	6.7	5,847,601	204,666	3.5	749,582	52,471	7.0
West Virginia [5]	9	45,744	2,966	6.5	388,067	20,841	5.4	1,221	55	4.5
Wyoming	13	82,848	5,385	6.5	143,331	6,020	4.2	12,061	796	6.6
Total	158	5,457,367	360,603	6.6	11,257,267	417,249	3.7	1,198,477	84,692	7.1

State	Finished gasoline and naphtha			Other products [6]			Total		
	Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon
Arkansas	31	2	6.5	1,396	74	5.3	97,539	4,717	4.8
California	--------	------	--	--------	------	--	994,862	65,317	6.6
Colorado	--------	------	--	--------	------	--	145,579	6,964	4.8
Kansas	--------	------	--	420	29	6.8	740,901	30,113	4.1
Kentucky [3]	--------	------	--	--------	------	--	598,117	27,931	4.7
Louisiana	262,594	22,846	8.7	142,901	9,146	6.4	2,731,874	148,832	5.4
Michigan	--------	------	--	--------	------	--	85,353	4,422	5.2
Mississippi	--------	------	--	369	25	6.8	48,732	2,581	5.3
Montana [4]	--------	------	--	--------	------	--	92,554	3,758	4.1
Nebraska	--------	------	--	--------	------	--	24,768	1,363	5.5
New Mexico	--------	------	--	8,369	511	6.1	1,117,798	46,641	4.2
North Dakota	--------	------	--	--------	------	--	106,233	4,329	4.1
Oklahoma	235	15	6.5	2,656	167	6.3	1,464,794	66,769	4.6
Pennsylvania	--------	------	--	--------	------	--	2,705	164	6.1
Texas	176,407	13,407	7.6	36,664	2,823	7.7	9,620,072	461,625	4.8

West Virginia [5]	--------	------	--	---------	------	--	435,032	23,862	5.5
Wyoming	--------	------	--	184	14	7.4	238,424	12,215	5.1
Total	439,267	36,270	8.3	192,959	12,789	6.6	18,545,337	911,603	4.9

[1] Includes isopentane.
[2] A producer operating in more than 1 state is counted but once in arriving at total United States.
[3] Illinois (1 operator) included with Kentucky.
[4] Utah (3 operators) included with Montana.
[5] Florida (1 operator) included with West Virginia.
[6] Includes kerosine, jet fuel, distillate fuel, etc.

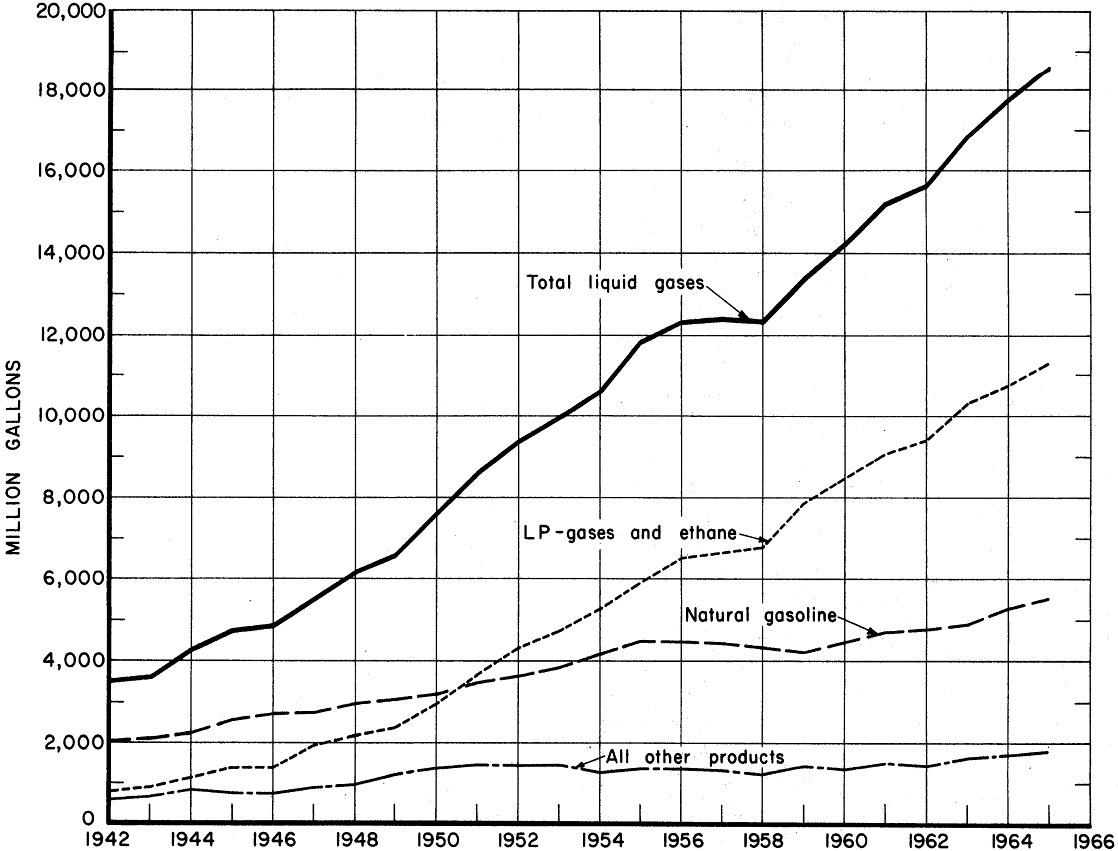

Figure 1.—Production of natural gas liquids in the United States, 1942–65.

Table 4.—Monthly production of natural gas liquids and ethane in the United States in 1965, by States and districts [1]

(Thousand gallons)

States by petroleum districts	January	February	March	April	May	June	July	August	September	October	November	December	Total
District 1:													
Western Pennsylvania	238	224	258	256	195	150	170	237	230	246	245	256	2,705
West Virginia and Florida	38,263	35,539	39,274	37,981	33,814	33,027	33,936	35,764	33,908	38,653	36,890	37,983	435,032
Total	38,501	35,763	39,532	38,237	34,009	33,177	34,106	36,001	34,138	38,899	37,135	38,239	437,737
District 2:													
Illinois and Kentucky	53,006	48,040	53,680	52,391	47,754	45,376	48,097	48,497	49,639	50,370	50,921	50,346	598,117
Michigan	6,223	7,715	8,851	6,020	6,613	6,141	7,051	8,289	7,084	6,866	6,512	7,988	85,353
Kansas	43,726	56,775	67,820	63,740	60,558	43,532	45,645	47,634	47,374	88,361	96,631	79,105	740,901
Nebraska	2,359	2,290	2,573	1,500	1,444	1,278	1,209	1,974	2,613	2,501	2,530	2,497	24,768
North Dakota	10,200	8,835	9,156	8,554	8,901	8,239	9,628	9,187	7,536	6,491	9,045	10,461	106,233
Oklahoma	130,617	117,136	130,288	121,585	121,083	114,151	118,592	118,050	115,246	121,451	124,472	132,123	1,464,794
Total	246,131	240,791	272,368	253,790	246,353	218,717	230,222	233,631	229,492	276,040	290,111	282,520	3,020,166
District 3:													
Arkansas	8,182	7,647	8,354	7,930	7,516	8,072	8,323	8,462	8,319	8,356	7,752	8,626	97,539
Louisiana:													
Gulf	177,731	162,026	182,585	168,128	165,190	158,050	167,089	165,357	141,653	169,859	178,104	194,600	2,030,372
Inland	62,437	53,330	59,115	53,362	57,515	55,204	58,689	59,327	57,165	59,835	61,288	64,235	701,502
Total Louisiana	240,168	215,356	241,700	221,490	222,705	213,254	225,778	224,684	198,818	229,694	239,392	258,835	2,731,874
Mississippi and Alabama	4,430	3,941	4,376	4,098	4,054	4,013	4,103	4,017	3,957	4,085	3,791	3,867	48,732
New Mexico	94,563	84,522	95,309	96,492	95,046	90,537	94,879	93,696	99,216	95,312	91,724	95,502	1,117,798
Texas:													
Gulf	176,233	158,831	172,947	168,129	170,311	165,445	168,404	168,086	160,461	169,798	165,381	173,497	2,017,523
West	248,157	220,597	255,606	250,482	264,069	261,998	269,050	272,575	251,737	266,247	257,814	281,323	3,099,655
East (field)	14,412	13,213	15,040	15,665	15,305	15,497	17,004	16,078	15,214	15,428	15,554	17,741	186,151
Panhandle	123,986	108,692	122,483	118,766	118,622	109,118	117,164	113,573	114,805	122,426	123,856	128,562	1,422,053
Rest of State (other)	219,248	229,734	252,040	238,758	241,371	238,407	247,772	241,831	246,212	241,971	238,660	258,686	2,894,690
Total Texas	782,036	731,067	818,116	791,800	809,678	790,465	819,394	812,143	788,429	815,870	801,265	859,809	9,620,072
Total	1,129,379	1,042,533	1,167,855	1,121,810	1,138,999	1,106,341	1,152,477	1,143,002	1,089,739	1,153,317	1,143,924	1,226,639	13,616,015
District 4:													
Colorado	14,049	11,370	12,895	12,070	12,760	11,035	10,546	11,754	11,627	13,145	12,372	11,956	145,579
Montana and Utah	7,998	7,253	7,639	7,574	8,112	8,619	8,516	7,471	7,266	7,511	7,168	7,427	92,554
Wyoming	21,212	18,780	20,785	20,562	19,292	18,500	19,108	18,910	19,870	20,496	19,676	21,233	238,424
Total	43,259	37,403	41,319	40,206	40,164	38,154	38,170	38,135	38,763	41,152	39,216	40,616	476,557
District 5:	91,421	81,883	89,318	83,978	81,749	80,749	80,352	78,960	76,778	80,432	82,085	87,157	994,862
Grand total	1,548,691	1,438,373	1,610,392	1,538,021	1,541,274	1,477,138	1,535,327	1,529,729	1,468,910	1,580,840	1,592,471	1,675,171	18,545,337

[1] West Pennsylvania separated from eastern part of State to allow grouping in either Bureau of Mines refinery district or Petroleum Administration for Defense district. Districts shown for Texas and Louisiana are Bureau of Mines production districts. (These districts are described under the heading "Districts").

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Table 5.—Production of natural gas liquids at natural gas processing plants, and disposition of residue gas in the United States in 1964–1965, by States

(Millions of cubic feet at 14.73 pounds per square inch unless otherwise stated)

State	Total natural gas liquids and ethane production (thousand gallons)	Natural gas processed	Extraction loss (shrinkage)	Disposition of residue gas					Total residue gas
				Used at plants	Returned to formation	Vented or flared	Pipeline		
							Returned to producer	To other companies	
1964:									
Arkansas	91,698	127,167	4,069	3,586	20,302	40	325	98,845	123,098
California	1,072,987	529,359	36,769	32,920	182,201	294	80,232	196,943	492,590
Colorado	141,316	117,270	5,526	4,040	27,487	243	10,674	69,300	111,744
Kansas	675,472	799,761	21,358	6,880	--------	147	248,337	523,039	778,403
Kentucky [1] [2]	552,915	488,210	28,345	993	123	200	194,237	264,312	459,865
Louisiana	2,600,464	2,829,286	64,473	44,224	179,599	258	157,847	2,382,885	2,764,813
Michigan	65,066	114,265	1,577	2,253	--------	274	13	110,148	112,688
Mississippi	50,762	82,325	1,826	2,171	23,213	36	9,625	45,454	80,499
Montana [3]	101,842	52,667	3,798	4,053	16,371	172	3,059	25,214	48,869
Nebraska	34,143	10,337	1,767	549	11	-----	4,276	3,734	8,570
New Mexico	1,095,237	722,424	47,840	37,341	12,422	4,028	107,214	513,579	674,584
North Dakota	105,706	32,188	5,378	4,289	--------	353	4,416	17,752	26,810
Oklahoma	1,434,857	895,038	52,883	43,913	60,711	1,305	81,310	654,916	842,155
Pennsylvania	2,619	2,137	114	13	50	-----	801	1,159	2,023
Texas	9,033,696	5,856,166	417,042	257,495	871,180	18,186	784,098	3,508,165	5,439,124
West Virginia [4]	445,207	329,854	17,022	5,073	r --------	-----	r 126,226	181,533	312,832
Wyoming	239,785	187,672	8,853	6,945	r 13,363	20	r 12,412	146,079	178,819
Total	17,743,772	13,176,126	718,640	456,738	r 1,407,033	25,556	r 1,825,102	8,743,057	12,457,486
1965:									
Arkansas	97,539	120,499	4,602	3,842	17,979	32	357	93,687	115,897
California	994,862	516,232	35,943	32,415	168,991	284	103,303	175,296	480,289
Colorado	145,579	133,640	5,251	4,426	20,859	5	12,176	90,923	128,389
Kansas	740,901	819,390	19,635	7,046	--------	60	220,642	572,007	799,755
Kentucky [1] [2]	598,117	529,000	36,740	4,430	--------	-----	439,096	48,734	492,260
Louisiana	2,731,874	2,870,052	72,437	48,335	159,866	1,201	150,238	2,437,975	2,797,615
Michigan	85,353	130,342	2,827	1,841	5,242	-----	12	120,420	127,515
Mississippi	48,732	64,809	1,498	2,217	20,630	164	8,401	31,899	63,311
Montana [3]	92,554	41,053	2,985	3,888	8,741	26	2,964	22,449	38,068
Nebraska	24,768	11,905	1,541	586	115	-----	2,821	6,842	10,364
New Mexico	1,117,798	858,756	37,533	39,038	13,204	11,905	123,237	633,839	821,223
North Dakota	106,233	39,775	5,927	5,294	--------	1,629	19,670	7,255	33,848
Oklahoma	1,464,794	920,391	46,083	40,437	45,698	2,064	101,502	684,607	874,308
Pennsylvania	2,705	1,686	119	9	52	-----	27	1,479	1,567
Texas	9,620,072	6,201,909	454,545	270,793	830,758	20,168	966,132	3,659,513	5,747,364
West Virginia [4]	435,032	324,337	16,007	1,618	--------	-----	125,546	181,166	308,330
Wyoming	238,424	188,325	9,800	7,324	18,595	1,754	12,775	138,077	178,525
Total	18,545,337	13,772,101	753,473	473,539	1,310,730	39,292	2,288,899	8,906,168	13,018,628

r Revised.
[1] Includes gas from transmission lines previously processed in another State.
[2] Illinois included with Kentucky.
[3] Utah included with Montana.
[4] Florida included with West Virginia.

materials. Propane, which represented 56 percent of the liquefied petroleum gases produced in 1965, amounted to 5,708 million gallons, an increase of 4.8 percent over the preceding year's total. Ethane production amounted to 1,116 million gallons in 1965—132 million gallons, or 13.4 percent, more than in 1964.

NATURAL GAS PROCESSED, YIELDS, AND DISPOSITION OF RESIDUE GAS

The average yield of natural gas liquids per thousand cubic feet of natural gas processed was 1.346 gallons in 1965, about the same as in 1964. However, the total amount of natural gas processed increased 595,975 million cubic feet or 4.5 percent.

The disposition of the residue gas after the liquids have been extracted is indicated in table 5. Prior to 1962, the extraction loss per gallon of liquid was considered to be about 34 cubic feet. Subsequently an improvement in the accuracy of reporting the ethane component of the liquids made it necessary to revise the extraction loss factor. As a result the extractive loss per gallon expanded to 40 cubic feet in 1962 and 1963 and about 40.5 cubic feet in 1964 and in 1965.

Residue gas, or the gas that remains after the liquids are extracted, increased to 13,018,628 million cubic feet, a gain of 4.5 percent. In 1965, 86 percent of the residue gas was marketed and 10 percent was returned to the field and used for repressuring or pressure maintenance. About 3.6 percent was consumed as fuel in the plant which processed the natural gas to obtain the natural gas liquids. The remaining 0.3 percent was vented or flared.

DEMAND FOR NATURAL GAS LIQUIDS AT PROCESSING PLANTS AND TERMINALS

Demand for natural gas liquids at plants and terminals in 1965 was 18,501 million gallons, compared with 17,682 million gallons in 1964, and, similar to the preceding year, 51 percent of the total was directed to refineries for use in gasoline blending. Shipments of natural gas liquids for blending totaled 9,442 million gallons in 1965 as compared with 8,977 million in 1964.

Other Uses.—Shipments of ethane for use in the manufacture of chemicals totaled nearly 1,114 million gallons in 1965, which was 13.2 percent greater than in the preceding year.

In addition to these materials there were other finished products shipped from natural gas processing plants during 1965. These aggregated 650 million gallons of which 69 percent was finished gasoline. Other finished products shipped were as follows: special naphthas, 5.3 million gallons; jet fuel, 4.7 million gallons; kerosine, 54.9 million gallons; distillate fuel oil, 15.0 million gallons; and other miscellaneous products, 122.3 million gallons for a total of 202.2 million gallons.

An examination of the specific uses for the liquefied petroleum gases is available in this chapter under the heading "Shipments of Liquefied Petroleum Gases and Ethane."

VALUE AND PRICE

The total value at the plants for natural gas liquids and ethane in 1965 was $911.6 million, or an average of 4.9 cents per gallon. Table 11 shows a comparison between the years 1964 and 1965 of the production, value, and average price per gallon for the various natural gas liquids products. The increasing demand of the petrochemical industry for natural gas liquids for use as feedstocks and a tighter supply situation resulted in firmer market prices as shown in table 12.

Table 6.—Supply and distribution at plants and terminals of natural gas liquids and ethane in the United States in 1965, by months

(Thousand gallons)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Production:													
Natural gasoline	429,413	393,072	447,045	441,273	449,075	449,635	478,796	465,521	434,971	453,072	442,190	471,781	5,355,844
Ethane	88,192	80,538	99,794	93,786	91,808	89,238	92,378	92,892	95,457	97,830	96,354	97,567	1,115,834
LP gases:													
Propane	484,098	462,671	508,352	477,551	467,967	430,929	443,344	453,969	431,674	501,518	513,760	531,670	5,707,503
Butane, normal	216,158	204,599	229,253	221,878	220,515	205,651	207,702	214,852	205,691	222,724	223,426	234,554	2,607,003
Isobutane	81,963	81,947	88,890	87,119	86,869	79,258	86,252	80,495	80,746	89,135	92,642	93,982	1,029,829
Butane-propane mixture	35,557	31,923	36,712	31,639	29,292	28,917	33,169	29,954	27,109	29,928	28,489	32,447	375,136
Other LP gas mixtures	38,585	33,276	37,546	36,030	37,303	38,113	36,949	33,026	32,073	33,712	31,826	34,054	422,493
Isopentane	8,486	7,902	8,063	6,311	7,763	7,732	7,248	9,621	9,054	9,838	9,649	9,856	101,523
Finished gasoline and naphtha	42,847	37,544	40,588	37,108	37,670	36,119	34,952	33,009	32,746	33,252	33,762	39,670	439,267
Condensate, raw	104,964	88,884	96,024	89,330	96,545	96,983	100,081	101,442	104,552	103,786	104,235	111,651	1,198,477
Other finished products	18,428	16,017	18,125	15,996	16,467	14,563	14,456	14,948	14,837	15,045	16,138	17,939	192,959
Total	1,548,691	1,438,373	1,610,392	1,538,021	1,541,274	1,477,138	1,535,327	1,529,729	1,468,910	1,589,840	1,592,471	1,675,171	18,545,337
Stock change at plants at terminals	−182,589	−138,523	−69,702	+155,639	+228,678	+155,112	+195,533	+144,265	+7,103	−31,452	−142,304	−277,232	+44,528
Shipments:													
To refineries:													
Natural gasoline	415,021	389,717	450,189	437,571	422,249	453,452	481,273	466,431	438,761	450,433	449,839	468,495	5,323,431
LP gases:													
Propane	11,046	7,182	9,198	3,318	3,528	2,814	7,896	5,544	4,788	8,232	7,014	4,788	75,348
Butane, Normal	185,596	146,993	124,980	100,135	85,883	82,166	96,932	110,531	145,262	173,253	195,574	216,667	1,663,972
Isobutane	74,216	70,021	80,652	78,785	82,369	81,559	71,194	83,173	83,890	85,467	82,634	87,833	961,784
Butane-propane mixture	6,426	5,040	3,948	1,176	5,124	6,006	6,132	7,644	9,324	10,668	9,408	9,324	80,220
Other LP gas mixtures	2,016	1,722	2,730	6,090	2,058	2,058	1,722	1,722	2,226	1,680	3,612	9,324	36,960
Isopentane	8,773	7,785	8,440	6,124	7,987	7,735	7,364	9,599	9,236	8,898	10,343	9,957	102,241
Condensate	104,435	88,290	96,150	90,086	95,568	96,011	101,946	100,717	104,198	103,093	101,966	115,300	1,197,760
Fuel and chemical use:													
Finished gasoline and naphtha	42,830	34,887	39,768	34,580	45,951	40,709	34,482	36,493	34,515	32,351	36,916	39,471	452,953
Ethane	87,481	81,116	100,455	90,378	90,317	86,276	93,171	94,576	94,832	99,130	97,170	98,930	1,113,832
LP gases:													
Propane	634,754	612,762	624,031	391,223	332,554	327,413	333,239	351,922	415,162	478,656	571,773	681,408	5,754,897
Butane, normal	69,659	49,740	52,281	56,340	59,535	61,795	31,181	50,633	58,796	103,140	112,640	132,538	838,278
Isobutane	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Butane-propane mixture	30,100	31,910	34,071	30,138	39,820	21,440	26,776	22,611	18,396	18,376	15,316	24,421	313,375
Other LP gas mixtures	40,525	31,022	32,714	40,891	23,435	39,138	31,648	29,348	27,253	33,293	24,362	35,239	388,868
Other finished products	18,402	18,709	20,487	15,547	16,218	13,463	14,838	14,520	15,168	14,622	16,208	18,708	196,890
Total demand for natural gas liquids at terminals	1,731,280	1,576,896	1,680,094	1,382,382	1,312,596	1,322,026	1,339,794	1,385,464	1,461,897	1,621,292	1,734,775	1,952,403	18,500,809

Table 7.—Natural gas liquids utilized at refineries in the United States in 1965 by Bureau of Mines refinery districts and by months

(Thousand gallons)

District [1]	January	February	March	April	May	June	July	August	September	October	November	December	Total
East Coast	21,966	24,696	21,630	21,210	14,616	15,876	13,986	20,916	22,512	26,922	21,504	22,386	248,220
Appalachian	5,880	3,318	2,268	1,302	1,638	1,932	1,344	1,722	2,016	4,494	5,208	5,628	36,750
Indiana, Illinois, Kentucky, etc.	94,374	80,850	74,382	62,202	55,902	61,782	63,798	66,444	84,252	94,416	101,556	105,588	945,546
Minnesota, Wisconsin, North Dakota, and South Dakota	9,576	7,854	6,972	5,250	4,998	5,460	7,392	8,652	6,510	6,552	10,248	11,088	90,552
Oklahoma, Kansas, Missouri	76,188	65,016	65,604	57,078	60,144	58,296	57,078	70,014	74,970	67,116	77,280	79,338	808,122
Texas:													
Inland	92,988	71,358	74,886	78,624	80,094	81,984	89,712	90,804	84,420	86,268	82,152	84,882	998,172
Gulf Coast	300,762	269,808	308,448	305,298	295,050	314,244	333,732	333,480	325,038	348,474	345,870	371,868	3,852,072
Total Texas	393,750	341,166	383,334	383,922	375,144	396,228	423,444	424,284	409,458	434,742	428,022	456,750	4,850,244
Louisiana-Arkansas:													
Louisiana Gulf Coast	82,572	68,124	72,702	71,526	70,518	70,602	71,988	69,636	65,898	83,790	79,044	91,434	897,834
Arkansas and Louisiana Inland	25,830	24,066	25,956	26,208	26,628	23,688	23,730	25,788	25,074	26,376	24,150	23,982	301,476
Total Louisiana-Arkansas	108,402	92,190	98,658	97,734	97,146	94,290	95,718	95,424	90,972	110,166	103,194	115,416	1,199,310
New Mexico	3,108	3,066	3,402	2,562	3,822	3,318	3,402	5,082	4,074	5,124	3,822	4,326	45,108
Other Rocky Mountain	17,640	14,994	16,002	17,178	15,918	16,674	17,010	18,606	17,934	19,194	17,976	18,522	207,648
West Coast	93,408	87,696	94,458	89,250	82,404	80,682	82,950	87,150	85,386	88,410	90,132	84,966	1,046,892
Total United	824,292	720,846	766,710	737,688	711,732	734,538	766,122	798,294	798,084	857,136	858,942	904,008	9,478,392

[1] Districts are described under the heading "Districts."

Table 8.—Percentage of natural gas liquids in refinery gasoline in the United States by Bureau of Mines refinery districts [1]

Year	East Coast	Appalachian	Indiana, Illinois, Kentucky, etc.	Minnesota, Wisconsin, North Dakota, and South, Dakota	Oklahoma, Kansas, Missouri, etc.	Texas Inland	Texas Coast Gulf	Louisiana Gulf Coast	Arkansas and Louisiana Inland	Rocky Mountain	West Coast	Total
1961	1.1	(2)	4.9	4.6	12.4	30.9	15.2	13.4	33.9	8.5	12.7	11.2
1962	1.3	0.7	5.1	5.4	12.4	31.0	17.8	14.2	34.2	7.5	11.6	11.9
1963	1.9	2.7	5.5	6.1	12.4	31.1	18.7	11.7	30.7	9.3	11.0	11.9
1964	2.5	2.4	5.8	7.1	12.0	30.9	18.1	11.7	31.0	8.8	11.0	11.6
1965	2.9	2.4	7.1	7.6	12.0	30.0	23.7	13.2	29.3	7.4	10.7	13.3

[1] Bureau of Mines petroleum refining and PAD districts are described under the heading "Districts."
[2] Less than 0.5 percent.

Table 9.—Production of natural gas liquids and ethane at natural gas processing plants in the United States in 1965

(Thousand gallons)

States by petroleum districts	Liquefied petroleum gas and ethane						Natural gasoline and isopentane	Plant condensate	Finished gasoline and naphtha	All other products[1]	Total
	Propane	Butane	Butane-propane Mix	Isobutane	Other LP gas	Total					
District 1:											
Western Pennsylvania	1,064	619	------	------	------	1,683	1,022	------	------	------	2,705
West Virginia[2]	128,199	60,480	------	5,913	[3] 193,475	388,067	45,744	1,221	------	------	435,032
Total	129,263	61,099	------	5,913	193,475	389,750	46,766	1,221	------	------	437,737
District 2:											
Kentucky[4]	167,064	31,323	------	25,468	[3] 344,662	568,517	29,291	309	------	------	598,117
Michigan	36,091	13,438	10,811	294	15,665	76,299	9,054	------	------	------	85,353
Kansas	370,914	164,500	496	49,718	1,788	587,416	148,050	5,015	------	420	740,901
Nebraska	10,966	5,980	------	------	------	16,946	7,822	------	------	------	24,768
North Dakota	53,373	31,747	54	------	------	85,174	20,608	451	------	------	106,233
Oklahoma	587,673	218,535	24,772	42,129	21,556	894,665	498,298	68,940	235	2,656	1,464,794
Total	1,226,081	465,523	36,133	117,609	383,671	2,229,017	713,123	74,715	235	3,076	3,020,166
District 3:											
Arkansas	39,694	9,945	6,633	8,784	4,696	69,752	26,260	------	31	1,396	97,539
Louisiana:											
Gulf	566,456	250,605	16,875	148,419	[3] 21,171	1,003,526	593,512	257,019	108,435	67,880	2,030,372
Inland	155,181	73,279	37,282	30,770	------	296,512	103,748	72,062	154,159	75,021	701,502
Total Louisiana	721,637	323,884	54,157	179,189	21,171	1,300,038	697,260	329,080	262,594	142,902	2,731,874
Mississippi	10,716	2,412	9,022	------	------	22,150	23,625	2,588	------	369	48,732
New Mexico	396,042	257,208	29,403	59,683	[3] 16,915	759,311	349,402	716	------	8,369	1,117,798
Texas:											
Gulf	417,867	174,604	30,243	123,513	[3] 372,794	1,119,021	699,011	174,393	19,673	5,425	2,017,523
West	1,192,513	596,649	64,071	84,919	[3] 282,427	2,220,579	842,766	34,971	------	1,339	3,099,655
East (field)	78,886	40,325	2,666	------	9,116	130,993	52,476	2,124	------	558	186,151
Panhandle	420,185	192,035	13,236	254,485	12,236	892,177	515,150	1,429	12,980	317	1,422,053
Other	651,772	336,722	117,675	170,473	[3] 208,189	1,484,831	700,415	536,665	143,754	29,025	2,894,690
Total Texas	2,761,223	1,340,335	227,891	633,390	884,762	5,847,601	2,809,818	749,582	176,407	36,664	9,620,072
Total	3,929,312	1,933,784	327,166	881,046	927,544	7,988,852	3,906,465	1,081,967	439,032	189,699	13,616,015
District 4:											
Colorado	56,499	14,489	------	6,059	14,352	91,399	54,180	------	------	------	145,579
Montana[5]	41,005	23,155	1,676	------	------	65,836	26,718	------	------	------	92,554
Wyoming	79,754	60,540	------	------	3,037	143,331	82,848	12,061	------	184	238,424
Total	177,258	98,184	1,676	6,059	17,389	300,566	163,746	12,061	------	184	476,557
District 5	245,589	48,413	10,161	18,671	16,248	339,082	627,267	28,513	------	------	994,862
Grand total	5,707,503	2,607,003	375,136	1,029,298	[6] 1,538,327	11,257,267	5,457,367	1,198,477	439,267	192,959	18,545,337

[1] Includes jet fuel, kerosine, distillate, and other.
[2] Florida included with West Virginia.
[3] Includes ethane production.
[4] Illinois included with Kentucky.
[5] Utah included with Montana.
[6] Includes 1,115,834,000 gallons of ethane, of which 559,004,000 gallons were produced in Texas.

Table 10.—Liquefied petroleum gas and ethane (LR gas) produced at refineries for fuel and chemical uses in 1965

(Thousand gallons)

States by petroleum district	Propane	Butane-propane mix	Butane	Other LR gases	Total
District 1:					
East Coast [1]	260,694	9,576	28,140	5,670	304,080
West New York	25,956	------	1,932	-------	27,888
Pennsylvania	221,676	------	84	6,762	228,522
West Virginia	-------	------	336	-------	336
Total	508,326	9,576	30,492	12,432	560,826
District 2:					
Illinois	164,052	1,176	2,520	22,512	190,260
Indiana	49,518	------	1,638	-------	51,156
Kansas	82,950	84	9,702	-------	92,736
Kentucky	35,196	------	------	-------	35,196
Michigan	53,424	------	2,604	966	56,994
Minnesota [2]	43,050	5,418	168	84	48,720
Ohio	150,612	------	2,016	-------	152,628
Oklahoma	102,816	56,700	38,934	-------	198,450
Total	681,618	63,378	57,582	23,562	826,140
District 3:					
Arkansas	17,682	------	2,646	-------	20,328
Louisiana:					
Gulf	258,720	8,736	10,458	[3]233,898	511,812
Inland	882	1,302	8,400	-------	10,584
Total Louisiana	259,602	10,038	18,858	233,898	522,396
Mississippi [4]	32,466	1,134	------	-------	33,600
New Mexico	5,544	------	3,444	-------	8,988
Texas:					
Gulf	571,536	123,228	223,608	[3]907,200	1,825,572
Inland	84,336	------	34,608	-------	118,944
Total Texas	655,872	123,228	258,216	907,200	1,944,516
Total	971,166	134,400	283,164	1,141,098	2,529,828
District 4:					
Colorado	6,552	------	3,150	-------	9,702
Montana	9,198	------	1,176	-------	10,374
Utah	19,572	------	462	-------	20,034
Wyoming	6,720	------	12,894	672	20,286
Total	42,042	------	17,682	672	60,396
District 5	266,616	12,642	100,002	[3]130,662	509,922
Grand total	2,469,768	219,996	[5]488,922	[6]1,308,426	4,487,112

[1] Excludes Pennsylvania.
[2] Missouri, North Dakota, and Wisconsin included with Minnesota.
[3] Includes ethane production.
[4] Alabama included with Mississippi.
[5] Includes 21,546,000 gallons of isobutane used in petrochemical.
[6] Includes 378,470,000 gallons of ethane of which 345,156,000 gallons were produced in Texas.

STOCKS

Large increases in inventories of natural gasoline and isopentane and liquefied petroleum gases and ethane at plants and terminals slightly offset the shrinkage in inventories at the refinery level so there was a small net increase of nearly 8 million gallons in the volumes of natural gas liquids in storage at yearend (see table 13). Underground stocks of liquefied petroleum gases rose to 919 million gallons, an increase of 37 million gallons or about 4 percent. Over the decade, stocks of LP gases in underground storage have more than doubled; from 420 million gallons in 1956 to 919 million by the end of 1965.

Table 11.—Values and volumes of natural gas liquids and ethane produced in the United States

	Thousand gallons		Percent change	Thousand dollars		Percent change	Cents per gallon		Percent change
	1964	1965		1964	1965		1964	1965	
Natural gasoline	5,286,703	5,457,367	+ 3.2	341,714	360,603	+ 5.5	6.5	6.6	+ 1.5
LP gases and ethane	10,743,591	11,257,267	+ 4.8	362,792	417,249	+15.0	3.4	3.7	+ 8.8
Condensate	981,188	1,198,477	+22.1	69,966	84,692	+21.0	7.1	7.1	-----
Finished gasoline and naphthas	506,505	439,267	—13.3	37,815	36,270	— 4.1	7.5	8.3	+10.7
Other products	225,785	192,959	—14.5	14,105	12,789	— 9.3	6.2	6.6	+ 6.5
Total	17,743,772	18,545,337	+ 4.5	826,392	911,603	+10.3	4.7	4.9	+ 4.3

Table 12.—Average monthly prices, liquefied petroleum gas (propane) in the United States [1]

(Cents per gallon)

	January	February	March	April	May	June	July
New York Harbor:							
1964	7.97	8.00	7.88	7.42	7.25	7.25	7.25
1965	8.13	8.13	8.13	8.17	7.50	7.50	7.50
Oklahoma:							
1964	4.02	4.34	3.80	2.95	2.50	2.63	3.00
1965	4.00	4.00	3.97	3.69	3.63	3.63	3.70
Baton Rouge:							
1964	4.64	4.95	4.48	3.49	3.06	3.18	3.50
1965	4.60	4.50	4.47	4.19	4.13	4.13	4.17

	August	September	October	November	December	Average for year
New York Harbor:						
1964	7.25	7.27	7.59	7.75	8.10	7.58
1965	7.50	7.63	7.75	7.78	8.01	7.81
Oklahoma:						
1964	3.00	3.20	3.42	3.55	4.00	3.37
1965	3.94	4.28	4.50	4.58	4.93	4.07
Baton Rouge:						
1964	3.50	3.70	4.00	4.13	4.56	3.93
1965	4.25	4.56	4.88	5.00	5.18	4.50

Source: Platt's Oil Price Handbook.

[1] Producers' net contract prices (after some discounts and summer-fill allowances) for propane, tank cars/transport trucks.

STORAGE

Storage capacity increased 177 million gallons during the year ending September 30, 1965, and a substantial part of the growth was attributable to an increase in underground facilities in Kansas. Over the period from 1960–65, underground storage capacity had increased from 1.9 billion gallons by the end of September 1965. Most of this expansion took place in Texas and Kansas. Overall capacity, both aboveground and underground, aggregated some 4 billion gallons as of September 30, 1965, and these facilities were filled to 46 percent of capacity on that date (see table 14).

SHIPMENTS OF LIQUEFIED PETROLEUM GASES [3] AND ETHANE

The total shipments of liquefied petroleum gases for domestic uses,[4] excluding that part used in the production of gasoline, were 12,909 million gallons in 1965, an increase of 3.5 percent for the year. Declines in the use of liquefied petroleum gases for refining fuel and for secondary recovery of crude oil were more than offset by increases in uses in residential and in commercial establishments, industrial use, in internal combustion engines, by utilities for peak shaving purposes, for the manufacture of synthetic rubber, and as feedstock by the petrochemical industry. The 11 percent rise in the use of liquified petroleum gases as feedstock indicated in table 15, was the most significant development in 1965. However, residential and commercial purposes, still provides the largest outlet for liquefied petroleum gases accounting for 41 out of every 100 gallons used for domestic purposes.

[3] Data include liquefied refinery gases but exclude liquefied petroleum gases blended into gasoline.

[4] Description of the uses of liquefied petroleum gases reported in this section of the chapter:

Residential and Commercial.—All liquefied petroleum gases, by type, shipped or used in private households for heating, cooking, water-heating, and other household uses, such as clothes dryers and incinerators. Shipments to nonmanufacturing organizations, such as motels, restaurants, retail stores, laundries and other service enterprises, primarily for use in space heating, water-heating, and cooking.

Internal-Combustion Engine Fuel.—All gases by type, used by tractors, irrigation engines, highway vehicles of all kinds, forklift and other industrial tractors, and also oilfield drilling and production uses.

Industrial.—Liquefied petroleum gases shipped or used by manufacturing plants of all types for standby fuel, space heating, or other such uses as flame cutting, metallurgical furnaces, and plumber's torches.

Gas Companies.—Shipments made to gas utility companies for distribution through the mains.

Raw Material and Solvents for Chemical Plants and Synthetic Rubber Components.—Shipments of liquefied petroleum gases made to chemical plants and for use in the production of synthetic rubber.

All Other.—Liquefied petroleum gases shipped or used for agriculture purposes such as flame cultivation, crop drying, tobacco curing, poultry breeding, and miscellaneous other farm uses.

Table 13.—Stocks of natural gas liquids and ethane in the United States

(Thousand gallons)

Date	Natural gasoline and isopentane		LP gases and ethane		Other finished products and plant condensate		Total at plants and terminals	Total at refineries	Grand total
	At plants and terminals	At refineries	At plants and terminals	At refineries	At plants and terminals	At refineries			
Dec. 31:									
1961	136,490	62,118	1,263,892	30,198	54,166	9,954	1,454,548	102,270	1,556,818
1962	113,179	61,656	1,019,747	37,548	61,422	24,612	1,194,348	123,816	1,318,164
1963	100,188	68,040	1,132,750	33,306	67,412	15,666	1,300,350	117,012	1,417,362
1964	99,191	83,832	1,205,745	37,968	56,889	14,868	1,361,825	136,668	1,498,493
1965:									
Jan. 31	113,296	70,770	1,008,479	38,178	57,461	13,776	1,179,236	122,724	1,301,960
Feb. 28	116,768	69,510	865,925	37,044	58,020	14,322	1,040,713	120,876	1,161,589
Mar. 31	113,247	72,198	801,412	45,528	56,352	14,700	971,011	132,426	1,103,437
Apr. 30	117,136	68,040	950,941	36,960	58,573	14,490	1,126,650	119,490	1,246,140
May 31	143,738	66,444	1,160,072	38,808	51,518	9,156	1,355,328	114,408	1,469,736
June 30	139,918	77,574	1,321,522	27,678	49,000	8,064	1,510,440	113,316	1,623,756
July 31	137,325	89,334	1,521,425	27,468	47,223	6,342	1,705,973	123,144	1,829,117
Aug. 31	136,437	74,508	1,668,909	30,996	44,892	6,804	1,850,238	112,308	1,962,546
Sept. 30	132,465	78,204	1,681,730	26,292	43,146	9,702	1,857,341	114,198	1,971,539
Oct. 31	136,044	67,494	1,644,682	26,922	45,163	5,922	1,825,889	100,338	1,926,227
Nov. 30	127,701	70,014	1,511,676	27,930	44,208	5,502	1,683,585	103,446	1,787,031
Dec. 31	130,886	68,418	[1]1,235,478	24,654	39,989	6,972	1,406,353	100,044	1,506,397

[1] Includes 919 million gallons in underground storage.

Table 14.—Liquefied petroleum gas storage capacity and stock, September 30, 1965

(Thousand gallons)

State and district	Aboveground: At plants and terminals	Aboveground: At refineries	Underground at plants, terminals, and refineries	Total	Stocks as of Sept. 30, 1965
East Coast and Appalachian No. 1 [1]	15,210	9,408	119,788		
Total PAD District 1	15,210	9,408	119,788	144,406	91,487
Indiana, Illinois, Kentucky, and Appalachian No. 2:					
Indiana	(2)	(2)	(3)		
Illinois	[2] 15,125	[2] 14,070	71,167		
Kentucky	4,340	(4)	(3)		
Ohio	735	[4] 12,138	(3)		
Michigan	1,398	2,100	[3] 167,031		
Tennessee	------	------	-------		
Oklahoma, Kansas, Minnesota, and Wisconsin:					
Oklahoma	19,716	21,462	40,723		
Kansas	8,549	[5] 8,190	579,169		
Minnesota	(6)	4,620	13,650		
Missouri, Nebraska, North Dakota, Iowa, and Wisconsin	[6] 7,782	(5)	74,030		
Total PAD District 2	57,645	62,580	945,770	1,065,995	609,735
Texas Inland:					
Panhandle	28,368	(7)	203,922		
East	3,458	(7)	-------		
West	30,149	[7] 24,906	325,289		
Other	34,080	336	14,750		
Texas Gulf	20,679	39,270	1,381,968		
Louisiana Gulf and Alabama	15,572	[8] 15,120	286,655		
Arkansas and Louisiana Inland:					
Louisiana Inland	6,521	(8)	(9)		
Arkansas	1,464	(8)	-------		
Mississippi	1,208	(8)	[9] 188,812		
New Mexico	11,676	(7)	58,876		
Total PAD District 3	153,175	79,632	2,460,272	2,693,079	1,092,871
Rocky Mountain:					
Montana and Utah	1,640	[10] 1,554	[11] 21,828		
Wyoming	3,352	2,982	(11)		
Colorado	4,882	(10)	-------		
Total PAD District 4	9,874	4,536	21,828	36,238	26,161
West Coast	8,853	42,336	35,700	86,889	
Total PAD District 5	8,853	42,336	35,700	86,889	51,064
Total United States	244,757	198,492	3,583,358	4,026,607	[12] 1,871,318

[1] Includes storage capacity in Pennsylvania, West Virginia, Delaware, New Jersey, New York, Florida, and Georgia.

[2] Indiana included in Illinois.

[3] Kentucky, Indiana, and Ohio included in Michigan.

[4] Kentucky and Tennessee included in Ohio.

[5] Missouri, North Dakota, and Wisconsin included with Kansas.

[6] Minnesota included in Missouri, Nebraska, North Dakota, etc.

[7] Panhandle, East Texas, and New Mexico included in West Texas.

[8] Louisiana Inland, Mississippi, and Arkansas included in Louisiana Gulf and Alabama.

[9] Louisiana Inland included in Mississippi.

[10] Colorado included in Montana and Utah.

[11] Wyoming included in Montana and Utah.

[12] Includes 1,368 million gallons in underground storage at plants and terminals and 143 million gallons in underground storage at petroleum refineries.

Table 15.—Shipments of liquefied petroleum gases and ethane in the United States, 1961–65

(Thousand gallons)

	1961	1962	1963	1964	1965
United States, total	11,995,275	13,038,581	14,307,543	15,405,210	16,042,647
For export	149,052	162,735	193,073	225,346	315,464
For use in gasoline production	2,048,340	2,146,452	2,544,192	2,706,606	2,818,284
For all other uses	9,797,883	10,729,394	11,570,278	12,473,258	12,908,899
By type:					
Ethane	1,075,957	1,222,615	1,378,284	1,347,025	1,475,004
Propane	5,935,967	6,474,558	7,120,976	7,442,817	7,607,834
Butane	1,065,513	1,443,081	1,439,891	1,600,398	1,528,975
Isobutane	62,279	41,282	34,264	31,500	38,679
Butane-propane mixture	1,107,329	1,077,283	1,054,588	1,107,235	1,249,453
All other mixtures	550,838	470,575	542,275	944,283	1,008,954
By principal uses:					
Residential and commercial	4,318,215	4.712,682	5,053,157	r 5,180,794	5,345,972
Internal-combustion	880,315	931,611	999,363	1,176,260	1,193,818
Industrial	402,428	424,730	493,208	521,006	526,420
Refinery fuel	166,572	231,084	356,958	439,110	153,258
Utility gas	168,989	173,481	216,627	117,004	121,895
Chemical	3,239,479	3,571,339	3,771,413	r 4,315,725	4,802,780
Synthetic rubber	519,637	587,379	599,556	651,472	679,884
Secondary recovery of petroleum	51,683	41,676	21,319	9,573	8,391
Miscellaneous uses	50,565	55,412	58,677	62,314	76,481

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FOREIGN TRADE

Exports of liquefied petroleum gases in 1965, principally propane and butane, rose to 315 million gallons, an increase of 90 million gallons, or 40 percent. More than half of this gain is attributable to the increased market for LP gas in northern states of Mexico. Exports of liquefied petroleum gases to the United Kingdom rose spectacularly, because shipments of propane for gas enrichment purposes began to gather momentum. These exports increased from 429,000 gallons in 1964 to 33.7 million gallons in 1965.

Table 16.—Consumption of liquefied petroleum gases and ethane by use, excluding use in gasoline production, by PAD district and State

(Thousand gallons)

PAD District and State	Residential and commercial		Internal combustion engine fuel		Industrial fuel		Utility gas		Miscellaneous uses		Total [1]	
	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965
District 1:												
Connecticut	39,056	34,214	534	727	17,117	16,326	2,809	1,805	1,395	2,082	60,911	55,154
Delaware	15,980	14,243	387	423	2,065	2,221	------	649	43	41	18,475	17,577
Florida	223,262	202,351	23,072	19,362	12,156	8,267	8,675	7,610	498	439	267,663	238,029
Georgia	139,613	152,803	21,824	10,030	16,548	11,000	7,549	3,805	4,229	10,888	189,763	188,526
Maine	25,892	18,819	308	232	2,046	2,227	227	1,150	30	------	28,503	22,428
Maryland and District of Columbia	43,545	44,179	2,190	1,416	7,413	5,580	6,271	7,890	81	118	59,500	59,183
Massachusetts	40,953	45,732	1,414	3,196	10,166	8,517	4,867	4,991	540	586	57,940	63,022
New Hampshire	21,960	22,731	177	204	2,276	2,128	1,439	2,551	13	------	25,865	27,614
New Jersey	55,137	33,192	4,255	5,789	20,232	22,794	3,928	2,470	11	12	83,563	64,257
New York	138,707	111,356	6,284	5,525	12,954	16,100	1,067	340	101	107	159,113	133,428
North Carolina	112,229	126,644	1,801	2,488	11,861	14,905	1,366	439	15,173	13,113	142,430	157,589
Pennsylvania	75,686	66,661	8,502	8,654	32,565	29,168	987	2,268	91	620	117,831	107,371
Rhode Island	8,785	6,615	486	558	1,622	1,701	409	490	------	------	11,302	9,364
South Carolina	66,790	70,136	3,992	1,805	13,128	11,772	1,115	1,852	2,995	1,389	88,020	86,954
Vermont	17,710	15,618	75	136	1,204	784	1,129	2,375	------	------	20,118	18,913
Virginia	60,549	55,997	3,406	3,408	7,797	6,044	5,381	898	1,434	1,922	78,567	68,269
West Virginia	15,131	13,856	745	522	1,323	9,690	144	183	------	------	17,343	24,251
Total	1,100,985	1,035,147	79,452	64,475	172,473	169,224	47,363	41,766	26,634	31,317	1,867,790	1,872,184
District 2:												
Illinois	247,598	295,933	51,265	46,105	33,454	39,219	8,667	6,981	709	1,605	341,693	389,843
Indiana	154,396	197,289	9,130	7,580	49,257	56,058	2,573	3,602	1,320	1,449	216,676	265,978
Iowa	192,660	234,280	6,209	7,916	9,343	14,499	1,567	2,743	1,940	2,805	211,719	262,243
Kansas	177,367	197,221	42,356	42,738	7,013	8,205	------	------	501	489	227,237	248,653
Kentucky	70,797	78,780	8,031	5,148	15,976	15,950	3,298	2,750	247	229	98,349	102,857
Michigan	115,546	115,907	4,652	4,883	15,295	22,239	3,613	4,029	1,040	612	140,146	147,670
Minnesota	177,272	199,755	6,454	5,397	23,622	26,778	2,773	9,365	1,476	1,700	211,597	242,995
Missouri	274,812	303,331	6,546	6,822	5,955	6,504	2,485	3,478	546	144	290,344	320,279
Nebraska	116,240	125,772	17,173	14,284	1,147	1,360	2,700	1,699	338	96	137,598	143,211
North Dakota	37,483	37,458	5,056	3,234	6,037	6,370	1,722	947	750	492	51,048	48,501
Ohio	101,524	113,306	10,486	13,574	16,553	21,393	10,588	17,125	1,105	1,045	140,256	166,443
Oklahoma	228,165	229,348	62,222	70,860	11,305	2,770	------	527	1,251	774	302,943	304,279
South Dakota	54,866	59,187	4,181	3,543	1,908	1,770	227	147	79	140	61,261	64,787
Tennessee	52,418	56,119	11,633	7,881	10,438	13,232	1,351	3,155	10	------	75,850	80,387
Wisconsin	177,156	182,424	4,901	5,249	27,772	31,452	1,535	954	475	423	211,789	220,502
Total	2,178,300	2,426,110	250,295	245,214	235,025	267,799	43,099	57,502	11,787	12,003	3,376,048	3,606,747
District 3:												
Alabama	r 139,076	132,023	12,499	6,241	8,424	3,186	3,128	1,925	188	200	r 163,315	143,575
Arkansas	r 176,333	168,998	87,563	62,904	4,023	3,161	------	------	704	275	r 268,623	235,338
Louisiana	r 88,844	106,679	64,516	23,027	23,599	18,493	------	------	600	336	r 177,559	148,535
Mississippi	r 154,110	141,564	57,524	33,694	2,474	3,154	28	98	1,563	2,104	r 215,699	180,614

New Mexico	r 90,352	75,005	39,049	29,472	1,679	635	366	611	873	397	r 132,319	106,120
Texas	r 628,842	r 644,938	509,443	664,403	27,037	24,425	804	869	11,849	10,294	r 1,177,975	1,344,929
Total	r 1,277,557	1,269,207	770,594	819,741	67,236	53,054	4,326	3,503	15,777	13,606	6,164,189	6,384,472
District 4:												
Colorado	130,625	109,916	12,333	11,727	2,593	3,431	620	134	665	2,048	146,836	127,256
Idaho	19,882	17,204	1,912	617	5,427	4,749	------	------	174	975	27,395	23,545
Montana	32,362	31,436	4,269	1,926	2,434	5,536	------	------	20	20	39,085	38,918
Utah	19,624	24,976	3,523	1,804	2,129	1,184	------	------	40	499	25,316	28,463
Wyoming	27,729	26,292	11,453	7,065	4,574	10,601	------	------	41	118	43,797	44,076
Total	230,222	209,824	33,490	23,139	17,157	25,501	620	134	940	3,660	307,425	270,261
District 5:												
Alaska	3,585	3,805	27	21	------	------	------	------	-----	-----	3,612	3,826
Arizona	37,578	35,903	5,329	5,750	289	2,641	------	------	425	72	43,621	44,366
California	244,576	251,766	32,292	30,192	23,039	3,566	12,179	12,339	5,870	15,174	317,956	313,037
Hawaii	5,073	5,602	494	508	162	178	5,140	2,900	-----	-----	10,896	9,188
Nevada	25,381	25,637	1,775	1,273	------	------	3,040	3,346	-----	12	30,196	30,268
Oregon	37,231	38,811	879	511	847	789	616	187	152	98	39,725	40,396
Washington	40,306	44,160	1,633	2,994	4,778	3,668	621	218	729	539	48,067	51,579
Total	393,730	405,684	42,249	41,249	29,115	10,842	21,596	18,990	7,176	15,895	757,806	775,235
Total United States shipments	5,180,794	5,345,972	1,176,260	1,193,818	521,006	526,420	117,004	121,895	62,314	76,481	12,473,258	12,908,899

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[1] District totals do not equal the sum of State totals because of the inclusion in district totals and the exclusion in State totals of figures for refinery fuel, chemical, synthetic rubber, and secondary recovery uses to avoid disclosing company data. Data for these uses are shown in Table 18.

Table 17.—Consumption of liquefied petroleum gases and ethane, by type, by PAD district and State

(Thousand gallons)

PAD district and State	Propane		Butane		Butane-propane mixture		Total	
	1964	1965	1964	1965	1964	1965	1964	1965
District 1:								
Connecticut	60,899	55,086	-------	68	12	-------	60,911	55,154
Delaware	18,390	17,540	-------	-------	85	37	18,475	17,577
Florida	236,867	215,689	366	1,610	30,430	20,730	267,663	238,029
Georgia	155,100	175,600	3,035	1,071	31,628	11,855	189,763	188,526
Maine	28,503	22,428	-------	-------	-------	-------	28,503	22,428
Maryland and District of Columbia	59,192	58,837	-------	-------	308	346	59,500	59,183
Massachusetts	57,627	62,966	-------	-------	313	56	57,940	63,022
New Hampshire	25,098	26,809	767	805	-------	-------	25,865	27,614
New Jersey	83,156	62,455	29	1,454	378	348	83,563	64,257
New York	158,002	133,428	13	-------	1,098	-------	159,113	133,428
North Carolina	140,448	156,089	36	133	1,946	1,367	142,430	157,589
Pennsylvania	112,924	105,417	1,169	-------	3,738	1,954	117,831	107,371
Rhode Island	11,302	9,364	-------	-------	-------	-------	11,302	9,364
South Carolina	78,093	84,141	169	-------	9,758	2,813	88,020	86,954
Vermont	20,118	18,913	-------	-------	-------	-------	20,118	18,913
Virginia	78,220	68,202	347	67	-------	-------	78,567	68,269
West Virginia	17,325	15,113	-------	9,129	18	9	17,343	24,251
Total [1]	1,392,737	1,350,184	71,830	98,458	81,638	42,257	[2] 1,867,790	[2] 1,872,184
District 2:								
Illinois	336,070	386,839	4,184	2,528	1,439	476	341,693	389,843
Indiana	214,544	264,073	1,808	1,699	324	206	216,676	265,978
Iowa	211,522	262,025	197	216	-------	2	211,719	262,243
Kansas	208,123	228,670	6,413	8,959	12,701	11,024	227,237	248,653
Kentucky	96,616	101,961	222	79	1,511	817	98,349	102,857
Michigan	139,778	145,818	176	10	192	1,842	140,146	147,670
Minnesota	205,743	237,399	5,770	5,413	84	183	211,597	242,995
Missouri	280,257	312,193	3,112	1,613	6,975	6,473	290,344	320,279
Nebraska	136,285	142,673	719	214	594	324	137,598	143,211
North Dakota	45,598	44,875	2,139	1,142	3,311	2,484	51,048	48,501
Ohio	140,256	166,386	-------	35	-------	22	140,256	166,443
Oklahoma	247,667	249,223	17,400	7,150	37,876	47,906	302,943	304,279
South Dakota	60,223	62,292	110	18	928	2,477	61,261	64,787
Tennessee	70,878	76,813	360	284	4,612	3,290	75,850	80,387
Wisconsin	203,756	213,232	7,832	7,248	201	22	211,789	220,502
Total [1]	2,821,554	3,034,883	164,421	125,809	104,377	85,690	[2] 3,376,048	[2] 3,606,747
District 3:								
Alabama	r 120,334	108,800	3,044	1,421	r 39,937	33,354	r 163,315	143,575
Arkansas	r 196,097	181,306	14,511	8,334	r 58,015	45,698	r 268,623	235,338
Louisiana	r 102,648	88,816	6,040	3,366	r 68,871	56,353	r 177,559	148,535

Mississippi	[r] 138,820	115,234	8,014	4,008	[r] 68,865	61,372	[r] 215,699	180,614
New Mexico	[r] 109,973	95,261	4,969	1,775	[r] 17,377	9,084	[r] 132,319	106,120
Texas	[r] 671,838	642,914	[r] 64,161	36,662	[r] 441,976	665,353	[2] 1,177,975	1,344,929
Total [1]	2,429,953	2,429,501	1,250,453	1,211,139	845,158	1,043,425	[2] 6,164,189	[2] 6,384,472
District 4:								
Colorado	145,323	123,765	348	335	1,165	3,156	146,836	127,256
Idaho	27,245	22,798	-------	651	150	96	27,395	23,545
Montana	36,469	34,828	838	311	1,778	3,779	39,085	38,918
Utah	24,824	27,819	7	61	485	583	25,316	28,463
Wyoming	38,590	37,680	76	360	5,131	6,036	43,797	44,076
Total [1]	281,144	250,341	13,324	4,269	12,957	15,651	307,425	270,261
District 5:								
Alaska	3,590	3,826	-------	-------	22	-------	3,612	3,826
Arizona	39,788	43,151	-------	-------	3,833	1,215	43,621	44,366
California	267,726	263,546	1,377	-------	48,853	49,491	317,956	313,037
Hawaii	10,869	9,188	-------	-------	-------	-------	10,869	9,188
Nevada	30,136	30,197	-------	-------	60	71	30,196	30,268
Oregon	37,811	38,097	-------	-------	1,914	2,299	39,725	40,396
Washington	46,066	50,438	-------	-------	2,001	1,141	48,067	51,579
Total [1]	517,429	542,925	100,370	89,300	63,105	62,430	[2] 757,806	[2] 775,235
Total United States shipments	7,442,817	7,607,834	1,600,398	1,528,975	1,107,235	1,249,453	12,473,258	12,908,899

[r] Revised.

[1] District totals do not equal the sum of State totals because of the inclusion in District totals and the exclusion in State totals of figures for refinery fuel, chemical, synthetic rubber and secondary recovery uses to avoid disclosing company data. Data for these uses are shown in Table 18.

[2] Includes ethane, isobutane, and all other mixtures. See Table 18.

Table 18.—Consumption of liquefied petroleum gases and ethane for chemical, synthetic rubber, refinery fuel, and secondary recovery of petroleum uses, by type, by PAD district [1]

(Thousand gallons)

Use and PAD district	Ethane		Propane		Butane		Isobutane		Butane-propane mixture		All other mixtures		Total	
	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965	1964	1965
Chemical:														
District 1	275,607	341,488	46,389	57,050	61,899	79,113	1,128	798	90	81	44,850	38,999	429,963	517,529
District 2	240,661	312,422	55,524	97,245	51,199	66,009	2,220	2,220	481	1,084	42,815	45,385	392,900	524,703
District 3	819,585	802,548	r 1,009,630	1,190,932	r 548,458	559,891	28,152	35,323	r 140,707	170,850	744,940	810,048	r 3,291,472	3,569,592
District 4	--------	--------	--------	--------	--------	--------	-----	-----	------	------	------	--------	--------	--------
District 5	11,172	18,546	57,540	54,474	63,378	48,846	-----	-----	3,570	7,056	65,730	62,034	201,390	190,956
Total	1,347,025	1,475,004	r 1,169,083	1,399,701	r 724,934	753,859	31,500	38,769	r 144,848	179,071	898,335	956,466	r 4,315,725	4,802,780
Synthetic rubber:														
District 1	--------	--------	--------	--------	--------	--------	-----	-----	------	------	------	--------	--------	--------
District 2	--------	--------	--------	--------	--------	--------	-----	-----	------	------	------	--------	--------	--------
District 3	--------	--------	--------	--------	576,712	593,123	-----	-----	------	------	45,948	52,488	622,660	645,611
District 4	--------	--------	--------	--------	--------	--------	-----	-----	------	------	------	--------	--------	--------
District 5	--------	--------	--------	--------	28,812	34,273	-----	-----	------	------	------	--------	28,812	34,273
Total	--------	--------	--------	--------	605,524	627,396	-----	-----	------	------	45,948	52,488	651,472	679,884
Refinery fuel:														
District 1	--------	--------	5,084	5,057	4,000	5,008	-----	-----	1,836	2,661	------	--------	10,920	12,726
District 2	--------	--------	168,714	43,166	62,780	23,192	-----	-----	33,148	7,058	------	--------	264,642	73,416
District 3	--------	--------	77,136	5,782	24,544	2,559	-----	-----	9,410	1,361	------	--------	111,090	9,702
District 4	--------	--------	7,298	2,096	11,806	2,455	-----	-----	4,248	2,001	------	--------	23,352	6,552
District 5	--------	--------	20,490	44,681	6,803	6,181	-----	-----	1,813	------	------	--------	29,106	50,862
Total	--------	--------	278,722	100,782	109,933	39,395	-----	-----	50,455	13,081	------	--------	439,110	153,258
Secondary recovery of petroleum:														
District 1	--------	--------	--------	--------	--------	--------	-----	-----	------	------	------	--------	--------	--------
District 2	--------	--------	--------	--------	--------	--------	-----	-----	------	------	------	--------	--------	--------
District 3	--------	--------	3,477	456	--------	--------	-----	-----	------	------	------	--------	3,477	456
District 4	--------	--------	1,395	1,355	249	96	-----	-----	------	------	------	--------	1,644	1,451
District 5	--------	--------	3,413	5,327	--------	--------	-----	-----	1,039	1,157	------	--------	4,452	6,484
Total	--------	--------	8,285	7,138	249	96	-----	-----	1,039	1,157	------	--------	9,573	8,391
Total:														
District 1	275,607	341,488	51,473	62,107	65,899	84,121	1,128	798	1,926	2,742	44,850	38,999	440,883	530,255
District 2	240,661	312,422	224,238	140,411	113,979	89,201	2,558	2,558	33,629	8,142	42,815	45,385	657,542	598,119
District 3	819,585	802,548	r 1,090,243	1,197,170	r 1,149,714	1,155,573	28,152	35,323	r 150,117	172,211	790,888	862,536	r 4,028,699	4,225,361
District 4	--------	--------	8,693	3,451	12,055	2,551	-----	-----	4,248	2,001	------	--------	24,996	8,003
District 5	11,172	18,546	81,443	104,482	98,993	89,300	-----	-----	6,422	8,213	65,730	62,034	263,760	282,575
Total United States	1,347,025	1,475,004	r 1,456,090	1,507,621	r 1,440,640	1,420,746	31,500	38,769	r 196,342	193,309	944,283	1,008,954	r 5,415,880	5,644,313

r Revised. [1] State figures not shown to avoid disclosures of individual company data.

Table 19.—LP gases[1] exported from the United States, by country or area
(Thousand gallons[2])

Country or area	1956–60 (average)	1961	1962	1963	1964	1965
North America:						
Canada	27,213	4,134	3,657	6,347	4,900	2,496
Mexico	94,352	121,890	148,931	177,748	211,141	260,129
Bermuda and Caribbean	3,253	3,366	2,031	2,494	2,219	1,452
Central America	1,517	489	628	438	88	620
Other	5,866	------	------	------	------	53
Total	132,201	129,879	155,247	187,027	218,348	264,750
South America:						
Argentina	1,006	14,514	3,518	9	1,060	15,247
Brazil	7,739	454	18	169	425	2
Other	174	34	223	89	51	13
Total	8,919	15,002	3,759	267	1,536	15,262
Europe:						
Denmark	128	24	22	336	13	6
France	14	149	113	2,113	427	214
Germany, West	28	528	1,353	1,416	2,461	262
Italy	201	399	489	436	40	307
Netherlands	8	133	132	187	84	116
United Kingdom	26	1,566	354	174	429	33,682
Other	49	46	116	88	163	12
Total	454	2,845	2,579	4,750	3,617	34,599
Africa	90	212	325	109	172	83
Asia:						
Israel	25	9	15	27	71	59
Japan	142	673	374	172	245	530
Other	29	22	8	56	342	30
Total	196	704	397	255	658	619
Oceania	149	410	428	665	1,015	151
Grand total	142,009	149,052	162,735	193,073	225,346	315.464

[1] Data include LR gases.
[2] 4.5 pounds = 1 gallon.

Crude Petroleum and Petroleum Products

By James G. Kirby [1] and Betty M. Moore [2]

CONTENTS

GENERAL SUMMARY

The year 1965 was favorable to most segments of the petroleum industry. Production for the year increased sharply, demand for all major products paralleled the economic growth rate for the country. Crude oil prices remained fairly constant, but prices of refined products rallied from the loss of the last 2 years. Drilling activity, however, continued to decline, a trend which began in 1957.

Total demand [3] for all oils in 1965 averaged 11,490,000 barrels daily, a gain of 4.0 percent. The total new supply of all oils for the year was 11,482,000 barrels daily, resulting in a withdrawal from stocks of 2.9 million barrels.

[1] Industry economist, Division of Petroleum.
[2] Statistical assistant, Division of Statistics.
[3] Certain terms as used in this chapter are more or less unique to the petroleum industry. Principal terms and their meaning are:
Total demand.—A derived figure representing total new supply plus decreases or minus increases in reported stocks. Because there are substantial secondary and consumer's stocks that are not reported to the Bureau of Mines, this figure varies considerably from consumption.
Domestic demand.—Total demand less exports.
New supply of all oils.—The sum of crude oil production plus production of natural gas liquids, plus benzol (coke-oven) used for motor fuel, plus imports of crude oil and other petroleum products.
Transfers.—Crude oil conveyed to fuel-oil stocks without processing, or reclassification of products from one product category to another.
All oils.—Crude petroleum, natural gas liquids and their derivatives.
Principal product.—Gasoline, kerosine, distillate fuel, and residual fuel oil.
[4] Percentage change from 1964 to 1965 for total barrels or barrels daily will vary because of difference in number of calendar days.

Table 1.—Salient statistics of crude petroleum, refined products, and natural gas liquids in the United States

	1961	1962	1963	1964	p 1965
Crude petroleum:					
Domestic production__thousand barrels [1]__	2,621,758	2,676,189	2,752,723	2,786,822	2,848,514
World production ________________do____	8,183,899	8,882,324	9,537,359	10,309,116	11,063,154
United States proportion___percent__	32	30	29	27	26
Imports [2] ___________thousand barrels [1]__	381,548	411,039	412,660	438,643	452,040
Exports [3] _________________________do____	3,227	1,790	1,698	1,363	1,097
Stocks, end of year_______________do____	244,664	252,011	237,361	230,057	220,289
Runs to stills____________________do____	2,987,158	3,069,631	3,170,652	3,223,329	3,300,842
Value of domestic product at wells:					
Total ______________thousand dollars__	7,565,582	7,774,051	7,965,742	8,017,078	8,158,298
Average per barrel__________________	$2.89	$2.90	$2.89	$2.88	$2.86
Total producing oil wells December 31____	594,917	596,385	588,657	588,225	589,203
Total oil wells completed during year (successful wells) ____________________	21,850	21,372	20,288	20,620	18,761
Refined products:					
Imports [4] ___________thousand barrels [1]__	318,118	348,754	362,053	388,093	448,704
Exports [3] _________________________do____	60,336	59,600	74,216	72,516	66,754
Stocks, end of year_______________do____	543,343	553,848	564,451	573,499	580,188
Completed refineries, end of year_________	311	308	304	300	286
Daily crude-oil capacity thousand barrels [1]__	10,105	10,118	10,385	10,775	10,494
Natural gas liquids:					
Production _______________________do____	361,689	372,705	400,886	422,471	441,556
Stocks, end of year_______________do____	37,067	31,385	33,747	35,679	35,867
All oils:					
Total demand________thousand barrels [1]__	3,642,766	3,796,983	3,927,139	4,032,382	4,193,718
Exports __________________________do____	63,563	61,390	75,914	73,879	67,851
Domestic demand ________________do____	3,579,203	3,735,593	3,851,225	3,958,503	4,125,867

p Preliminary (except for crude production and value).
[2] Bureau of Mines data for crude oil and unfinished oils.
[3] U.S. Department of Commerce data.
[4] U.S. Department of commerce data, except for unfinished oils.

DEMAND BY PRODUCTS

As most of the indicated consumption of crude oil in the United States is converted into products at refineries, before sale to ultimate consumers, the analysis of demand trends involves consideration of each major product. The fuel oils (residual, distillate, and kerosine) compete directly with natural gas or coal in heating, cooking, and industrial uses. Gasoline and diesel fuel are the major fuels used in the transportation field, followed by jet fuel (a blend of low-grade gasoline, kerosine, and distillate) used in military jetplanes, and straight kerosine which is used as fuel by commercial jetplanes. The other products serve a wide variety of uses and are in competition with other refined products both for fuel and nonfuel use.

Gasoline.—Motor gasoline accounts for 40.0 percent of the total demand for all petroleum products. The demand for this product increased 4.0 percent to 1,676,220,000 barrels reflecting the record sales of new cars and the effects of the new interstate highway system on the driving habits of the American public. The demand for aviation grades of gasoline continued to decline in both the domestic and the export market, losing out to the jet fuels. The domestic demand for aviation gasoline in 1965 was 43,936,000 barrels, a decline of 5.6 percent. Exports totaled 4,159,000 barrels, 24.7 below the 1964 level. A breakdown of domestic demand by use indicates that in 1965 civilian highway use accounted for 92.7 percent; aviation fuels 2.6 percent; nonhighway vehicles, nonfuel use, and losses 4.7 percent.

Distillate Fuel Oil.—Increased industrial activity and colder weather increased demand for distillate fuel oil by 3.2 percent in 1965. Domestic demand totaled 775,989,000 barrels, an increase of 3.4 percent, but exports totaled only 3,673,000 barrels, a decrease of 31.8 percent from the previous year.

Residual Fuel Oil.—The growth of 31,852,000 barrels in domestic demand for residual fuel oil from 554,581,000 barrels in 1964 to 586,433,000 barrels in 1965 was practically all limited to the east coast market. Both coal and residual fuel oil benefited from the large increase in utility power generation and drought conditions which required both the utility companies

Table 2.—Supply and demand of all oils in the United States, 1964–65, by months and totals for 1963–65

(Thousand barrels)

	1964													1963 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	236,337	222,947	239,068	232,185	234,742	226,808	231,648	230,926	225,965	236,304	229,029	240,863	2,786,822	2,752,723
Natural gas liquids	36,596	34,278	36,229	34,173	34,577	33,086	34,737	35,067	34,886	35,867	35,707	37,268	422,471	400,886
Benzol, etc.	9	3	1	1	2	1	2	3	2	1	1	3	29	80
Total production	272,942	257,228	275,298	266,359	269,321	259,895	266,387	265,996	260,853	272,172	264,737	278,134	3,209,322	3,153,689
Imports: [1]														
Crude petroleum	39,635	32,209	36,945	33,091	35,968	34,387	43,820	40,743	36,853	39,224	34,102	31,666	438,643	412,660
Refined products	48,975	35,210	32,176	35,094	28,169	26,303	28,071	27,206	25,589	31,772	30,004	39,524	388,093	362,053
Total new supply	361,552	324,647	344,419	334,544	333,458	320,585	338,278	333,945	323,295	343,168	328,843	349,324	4,036,058	3,928,402
Increase (+) or decrease (−) in stocks	−22,770	−9,902	+6,362	+8,797	+24,676	+1,137	+12,857	+16,566	+3,185	+1,773	+4,231	−43,236	+3,676	+1,263
Demand:														
Total demand	384,322	334,549	338,057	325,747	308,782	319,448	325,421	317,379	320,110	341,395	324,612	392,560	4,032,382	3,927,139
Exports: [2]														
Crude petroleum	116	98	233	100	174	152	90	118	71	88	------	123	1,363	1,698
Refined products	6,784	4,716	5,855	6,688	5,857	6,123	6,686	6,022	5,556	6,507	5,400	6,322	72,516	74,216
Domestic demand:														
Gasoline, total	126,517	118,111	131,487	136,706	141,044	149,667	152,763	146,194	141,278	144,567	127,914	141,658	1,657,906	1,632,103
Motor gasoline	122,880	114,801	127,156	133,222	137,213	145,097	148,952	142,473	136,902	140,608	124,423	137,621	1,611,348	
Aviation gasoline	3,637	3,310	4,331	3,484	3,831	4,570	3,811	3,721	4,376	3,959	3,491	4,037	46,558	NA
Special naphthas	2,104	2,176	2,646	2,708	2,590	2,501	1,888	2,195	2,350	2,188	1,876	2,329	27,551	
Kerosine	14,745	11,538	8,258	5,851	4,356	3,223	4,572	5,203	6,395	7,852	7,469	13,276	92,738	[3] 172,212
Distillate fuel oil	96,077	81,561	73,409	59,540	46,838	43,864	41,138	41,347	48,115	57,325	66,085	95,125	750,424	747,254
Residual fuel oil	66,418	53,373	49,740	48,080	37,546	35,704	38,167	36,660	38,323	44,523	45,434	60,613	554,581	538,924
Jet fuel	16,183	14,475	16,350	17,058	17,145	18,919	18,006	18,323	17,950	17,710	17,345	14,789	204,253	[2] 115,237
Lubricants	3,984	3,351	3,776	4,387	3,595	4,321	3,971	3,722	3,928	3,739	3,585	3,429	45,788	43,601
Wax	314	255	339	321	289	288	308	281	311	323	315	252	3,596	3,809
Coke	5,789	5,709	6,260	5,557	5,430	6,001	5,952	6,247	5,955	5,948	5,546	6,001	70,395	69,323
Asphalt	3,273	3,318	4,349	7,127	11,936	15,563	16,681	16,655	15,529	13,895	7,951	3,878	120,155	117,354
Road oil	59	65	83	183	617	1,033	1,578	1,075	751	655	323	123	6,545	6,914
Still gas	10,617	9,942	10,820	10,618	11,212	11,654	12,208	11,479	10,935	10,539	10,438	10,795	131,257	129,598
Liquefied gases (including ethane) total	31,886	26,121	24,291	21,287	20,098	20,015	21,917	22,676	22,855	25,112	25,771	33,066	295,095	276,205
Liquefied refinery gas for fuel use	5,644	4,967	4,960	4,691	4,556	4,609	4,925	4,804	4,801	4,566	4,920	6,073	59,516	56,964
Liquefied refinery gas for chemical use	3,844	3,703	4,140	4,187	4,055	4,100	4,061	3,903	3,838	3,964	3,573	3,822	47,190	39,276
Liquefied petroleum gas for fuel and chemical use	22,398	17,451	15,191	12,409	11,487	11,306	12,931	13,969	14,216	16,582	17,278	23,171	188,389	179,965
Petrochemical feedstocks, total [4]	4,906	4,401	4,905	4,624	4,710	4,936	4,938	4,539	4,759	5,072	4,675	5,134	57,599	52,480
Still gas	730	664	718	672	647	511	649	639	601	641	619	607	7,698	7,834
Naphtha-400°	2,323	1,826	2,087	1,848	2,089	2,064	2,020	1,942	1,886	2,143	2,053	2,302	24,583	22,022
Other	1,853	1,911	2,100	2,104	1,974	2,361	2,269	1,958	2,272	2,288	2,003	2,225	25,318	22,624
Miscellaneous	1,530	1,340	1,261	1,390	1,244	1,566	1,395	1,248	1,287	1,414	1,332	1,346	16,353	16,350

Table 2.—Supply and demand for all oils in the United States, 1964–65, by months and totals for 1963–65—Continued

(Thousand barrels)

	1964													1963 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Domestic product demand	384,402	335,736	337,974	325,437	308,650	319,255	325,482	317,844	320,721	340,862	326,059	391,814	4,034,236	3,921,364
Crude losses	303	287	300	288	298	298	312	311	299	303	293	310	3,602	3,571
Less net processing gain	7,283	6,288	6,305	6,766	6,197	6,380	7,149	6,916	6,537	6,365	7,140	6,009	79,335	73,710
Total domestic demand	377,422	329,735	331,969	318,959	302,751	313,173	318,645	311,239	314,483	334,800	319,212	386,115	3,958,503	3,851,225
Stocks:														
Crude petroleum	241,007	240,062	246,863	253,912	257,322	251,230	246,333	237,912	232,780	235,233	236,809	230,057	230,057	237,361
Natural gas liquids	28,435	27,389	29,901	34,128	38,925	42,527	45,039	46,631	46,792	46,133	43,236	35,679	35,679	33,747
Refined products	543,347	535,436	532,485	530,006	546,475	550,102	565,344	588,739	596,895	596,874	602,426	573,499	573,499	564,451
Total stocks	812,789	802,887	809,249	818,046	842,722	843,859	856,716	873,282	876,467	878,240	882,471	839,235	839,235	835,559

	p 1965													1964 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	240,946	218,612	243,763	236,844	238,253	232,440	237,606	240,180	222,529	244,122	239,635	253,584	2,848,514	2,786,822
Natural gas liquids	36,960	34,319	38,409	36,676	36,764	35,230	36,614	36,496	35,048	37,913	37,976	39,151	441,556	422,471
Benzol, etc	2	2	1	3	1	1	------	------	------	------	2	1	13	29
Total production	277,908	252,933	282,173	273,523	275,018	267,671	274,220	276,676	257,577	282,035	277,613	292,736	3,290,083	3,209,322
Imports:[1]														
Crude petroleum	37,344	32,685	41,398	38,110	38,961	39,912	40,691	40,770	43,152	39,111	32,024	27,882	452,040	438,643
Refined products	47,246	41,468	42,788	41,573	32,858	33,287	30,566	29,944	28,389	36,247	35,376	48,962	448,704	388,093
Total new supply	362,498	327,086	366,359	353,206	346,837	340,870	345,477	347,390	329,118	357,393	345,013	369,580	4,190,827	4,036,058
Increase (+) or decrease (−) in stocks	−15,247	−22,068	−11,292	+12,224	+23,880	+13,343	+13,157	+10,863	+4,338	+12,094	−7,572	−36,611	−2,891	+3,676
Demand:														
Total demand	377,745	349,154	377,651	340,982	322,957	327,527	332,320	336,527	324,780	345,299	352,585	406,191	4,193,718	4,032,382
Exports:[2]														
Crude petroleum	89	45	3	187	------	68	421	------	------	182	94	8	1,097	1,363
Refined products	4,994	4,663	6,301	6,253	5,755	6,248	5,747	5,730	5,150	5,130	5,476	5,307	66,754	72,516
Domestic demand:														
Gasoline, total	124,968	119,597	140,389	140,865	149,590	155,167	156,731	154,355	142,465	147,009	140,054	148,966	1,720,156	1,657,906
Motor gasoline	121,398	116,295	137,001	137,542	145,135	151,616	152,780	150,798	138,960	143,080	136,205	145,410	1,676,220	1,611,348
Aviation gasoline	3,570	3,302	3,388	3,323	4,455	3,551	3,951	3,557	3,505	3,929	3,849	3,556	43,936	46,558
Special naphthas	2,361	2,567	2,801	2,520	2,405	2,947	1,625	2,928	2,689	2,277	2,205	2,507	29,832	27,551
Kerosine	12,953	11,956	11,049	6,328	4,303	4,527	4,871	5,905	5,974	7,675	9,385	12,655	97,581	92,738
Distillate fuel oil	92,814	86,932	83.916	61,037	45,824	41,846	44,283	47,940	49,822	56,948	71,684	92,943	775,989	750,424
Residual fuel oil	65,311	58,033	59,362	54,872	39,613	38,627	37,825	36,773	37,504	45,755	46,833	65,925	586,433	554,581
Jet fuel, total	18,666	14,793	17,222	17,552	19,730	18,237	18,567	20,002	19,635	18,172	18,571	19,441	220,588	204,253
Naphtha type	8,825	6,813	7,393	8,266	9,421	8,447	7,762	9,322	8,500	7,814	8,573	7,916	99,052	NA
Kerosine type	9,841	7,980	9,829	9,286	10,309	9,790	10,805	10,680	11,135	10,358	9,998	11,525	121,536	

	p 1965 January	February	March	April	May	June	July	August	September	October	November	December	Total	1964 total
Lubricants	3,872	3,219	4,301	3,785	4,152	4,257	4,125	4,050	3,976	3,817	3,785	3,698	47,037	45,788
Wax	311	308	342	288	306	336	279	305	350	331	365	315	3,836	3,596
Coke	6,609	6,327	6,443	5,428	5,928	5,552	6,290	6,230	6,606	5,760	6,042	6,412	73,627	70,395
Asphalt	3,489	3,507	4,794	7,749	12,279	15,730	17,184	17,811	15,503	14,686	9,425	5,410	127,567	120,155
Road oil	56	25	141	183	545	1,110	1,440	1,409	810	539	231	71	6,560	6,545
Still gas	11,322	10,441	11,175	10,635	11,405	11,600	12,442	12,336	11,208	10,955	10,644	11,132	135,295	131,257
Liquefied gases (including ethane) total	29,736	28,109	29,890	23,000	21,363	21,311	21,358	22,028	23,240	26,142	27,851	33,086	307,114	295,095
Liquefied refinery gas for fuel use	5,133	4,916	5,140	4,094	4,066	4,505	4,810	4,877	4,358	4,367	4,410	5,707	56,383	59,516
Liquefied refinery gas for chemical use	3,914	3,819	4,721	4,457	4,487	4,201	4,302	4,117	4,236	4,200	3,892	4,134	50,480	47,190
Liquefied petroleum gas for fuel and chemical use	20,689	19,374	20,029	14,449	12,810	12,605	12,246	13,034	14,646	17,575	19,549	23,245	200,251	188,389
Petrochemical feedstocks, total [4]	4,904	3,913	4,694	4,326	4,126	4,596	4,370	4,543	4,897	4,943	4,737	4,827	54,876	57,559
Still gas	909	633	786	759	846	751	741	676	656	732	672	765	8,926	7,698
Naphtha-400°	1,877	1,602	2,445	1,726	1,458	1,925	1,857	1,993	2,227	1,959	2,195	2,257	23,521	24,583
Other	2,118	1,678	1,463	1,841	1,822	1,920	1,772	1,874	2,014	2,252	1,870	1,805	22,429	25,318
Miscellaneous	1,412	1,264	1,445	1,137	1,373	1,392	1,374	1,440	1,282	1,283	1,247	1,308	15,957	16,353
Domestic product demand	378,784	350,991	377,964	339,705	322,942	327,235	332,764	338,055	325,961	346,292	353,059	408,696	4,202,448	4,034,236
Crude losses	307	280	305	292	303	303	319	316	300	312	306	317	3,660	3,602
Less net processing gain	6,429	6,825	6,922	5,455	6,043	6,327	6,931	7,574	6,631	6,617	6,350	8,137	80,241	79,335
Total domestic demand	372,662	344,446	371,347	334,542	317,202	321,211	326,152	330,797	319,630	339,987	347,015	400,876	4,125,867	3,958,503
Stocks:														
Crude petroleum	230,165	230,268	239,563	251,375	255,071	253,586	242,101	236,381	231,100	231,816	226,697	220,289	220,289	230,057
Natural gas liquids	30,999	27,657	26,272	29,670	34,994	38,661	43,550	46,727	46,941	45,863	42,548	35,867	35,867	35,679
Refined products	562,824	543,995	524,793	521,807	536,667	547,828	567,581	580,987	590,392	602,848	603,710	580,188	580,188	573,499
Total stocks	823,988	801,920	790,628	802,852	826,732	840,075	853,232	864,095	868,433	880,527	872,955	836,344	836,344	839,235

p Preliminary. NA Not available.
[1] Bureau of Mines data for crude oil and unfinished oils, U.S. Department of Commerce data for all other imports.
[2] U.S. Department of Commerce data.
[3] Not comparable to 1964–65 data. In 1963 demand figures for kerosine included those for commercial jet fuel. For subsequent years data for commercial jet fuel are included with those for jet fuel and excluded from kerosine.
[4] Produced at petroleum refineries. Data for LRG for petrochemical feedstocks are included with those for "Liquefied gases."

and industrial consumers to substitute other fuels for hydroelectric generating power.

Kerosine.—The total demand for kerosine in 1965 was 97,800,000 barrels, an increase of 5.3 percent. This demand covers kerosine and range oil uses but not the demand for kerosine used for fuel by jet aircraft. This is the first time in 3 years that demand has increased.

Jet Fuels.—The demand for jet fuel continues to increase at a rapid pace. In 1965 domestic demand averaged 604,000 barrels daily, or 3 times the average rate for 1957. In general, the military uses naphtha-type jet fuel while the kerosine-type is used by commercial jet aircraft. The domestic demand for naphtha-type jet fuel in 1965 was 99,052,000 barrels, and for the kerosine-type it was 121,536,000 barrels.

Other Products.—The total demand for all other products including crude oil exports and losses and refinery average in 1965 was 768,772,000 barrels compared with 741,675,000 barrels in 1964. The demand for liquefied gases, the largest segment included in this group, was 314,634,000 barrels, a gain of 4.7 percent. This includes all liquefied gas used for fuel for chemicals and for petrochemical feedstocks; asphalt demand increased 5.8 percent to 127,959,000 barrels and still gas increased 3.1 percent to 135,295,000 barrels. The increase in domestic demand for lubricating oils was not enough to offset the loss in exports so that total demand was slightly below the 1964 level. The demand for petrochemical feedstocks from products other than liquefied gases declined from 57,599,000 barrels in 1964 to 56,827,000 barrels in 1965. The demand for the other products in this group (special naphthas, wax, coke, road oil and miscellaneous finished products) were all above the 1965 level.

Shipments to U.S. Territories and Possessions.—Domestic demand, as defined in this chapter, refers to demand in all States of the United States. Shipments from the United States to territories and possessions are included with exports. Any foreign receipts into these territories and possessions are not included in the total imports shown.

Shipments from territories and possessions to foreign countries are excluded from total exports. Shipments to the United States are included in imports.

SCOPE OF REPORT

This report deals primarily with statistics for production, refining distribution, and indicated consumption of crude petroleum and refined products in the United States; it also contains a brief description of technological developments. The object of limiting data to the United States is to permit a breakdown and balancing of supply and demand of operations by States and districts. The composition of the districts used by the Bureau of Mines is explained in the next section.

The increasing volume of natural gas liquids recovered from natural gas has made it desirable to present data on these liquids with crude oil data, as these liquids are blended with refinery products and are similar to materials recovered from refinery gases. These natural gas liquids are recovered at natural-gas processing plants, away from the oil refineries.

Most of the data were compiled by the Bureau of Mines from detailed reports, submitted on a voluntary basis by the various companies. These data are published monthly for release about 8 weeks after the end of the month. Complete coverage, with only minor estimates, is procured for production, stocks, and refinery operations. The Bureau of Mines uses the import data on crude oil and unfinished oils as reported by the refineries. Other product imports and all export data are taken from records of the U.S. Department of Commerce.

The Bureau of Mines uses crude-oil production data compiled by State agencies for those States which compile the information. Where such data are not available, the Bureau of Mines sends monthly questionnaires to all pipeline companies operating within the State. Monthly reports are received from refineries showing crude oil receipts by States of origin and method of transportation. These reports include information covering final receipts by water, tank cars, and trucks and cover stocks of crude oil held at refineries, by States of origin. The Bureau of Mines crude production figure includes field condensate.

Individual refineries reported monthly receipts, input, stocks at the beginning and end of the month, refinery production, and

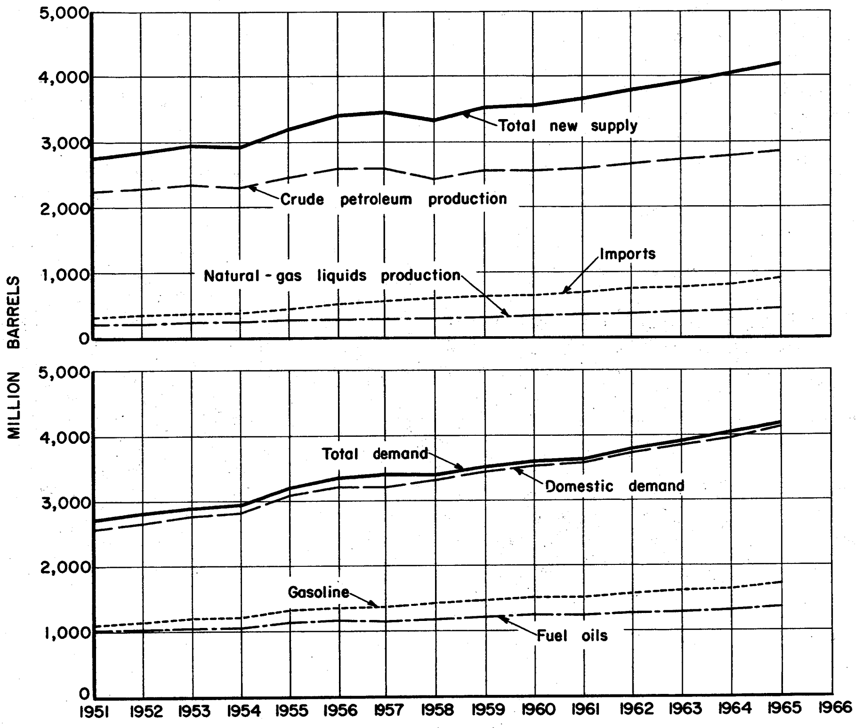

Figure 1.—Supply and demand of all oils in the United States, 1951–65.

deliveries. Data on both product stocks at refineries and pipeline and bulk terminal stocks are collected.

Semiannual canvasses of refineries, pipeline companies, and natural gas liquids plants provide data on storage tank capacities assigned to the various refined products and to liquefied gases at plants, terminals, and underground storage facilities.

Annual canvasses provide supplemental information on the value of crude petroleum at wells, the number of producing wells, sales of fuel oils, asphalt and road oils by uses, and refinery capacity.

The table showing world production of crude oil by countries is based on monthly reports that also included data on crude movements and refinery operations. Data on crude reserves, wells drilled, and current prices were taken from the sources indicated in the footnotes.

DISTRICTS

The Bureau of Mines reported production of crude petroleum and natural gas liquids and the number of wells drilled by States. Louisiana, New Mexico, and Texas were also reported by districts.

New Mexico has two widely separated producing areas. The Southeastern district comprises mainly Lea, Eddy, Chaves, and Roosevelt Counties. The Northwestern district comprises mainly San Juan, Rio Arriba, Sandoval, and McKinley Counties.

The Bureau of Mines producing districts in Texas correspond, with one exception, to grouping of the Texas Railroad Commission districts.

Bureau of Mines districts	*Railroad Commission districts*
Gulf Coast	Nos. 2 and 3
West Texas	Nos. 7C, 8 and 8a
East Proper	Part of No. 6 (East Texas field in Cherokee, Smith, Upshur, Rush, and Gregg
Panhandle	No 10
Rest of State:	
North	Nos 7B and 9
Central	No. 1
South	No. 4
Other East Texas	Nos. 5 and 6 (exclusive of East Proper)

The Bureau of Mines groups refinery operations into another set of districts called refining districts. These refining districts correspond with the grouping originated by the Petroleum Administration for War during World War II and called PAW districts (later changed to PAD districts).

PAD district	*Refining districts*
1	*East Coast*—Districts of Columbia and Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida, and the following counties of New York: Cayuga, Tompkins, Chemung, and all countries east and north thereof, and the following counties of Pennsylvania: Bradford, Sullivan, Columbia, Montour, Northumberland, Dauphin, York, and all counties east thereof.
1	*Appalachian No. 1*—West Virginia and those parts of Pennsylvania and New York not included in the East Coast district.
2	*Appalachian No. 2*—The following counties of Ohio: Erie, Huron, Crawford, Marion, Delaware, Franklin, Pickaway, Ross, Pike, Scioto, and all counties east thereof.
2	*Indiana-Illinois-Kentucky*—Indiana, Illinois, Kentucky, Tennessee, Michigan, and that part of Ohio not included in the Appalachian district.
2	*Oklahoma-Kansas-Missouri*—Oklahoma, Kansas, Missouri, Nebraska, and Iowa.

2_____ *Minnesota-Wisconsin-North Dakota-South Dakota*—Minnesota, Wisconsin, North Dakota, and South Dakota.

3_____ *Texas Inland*—Texas, except Texas Gulf Coast district.

3_____ *Texas Gulf Coast*—The following counties of Texas: Newton, Orange, Jefferson, Jasper, Tyler, Hardin, Liberty, Chambers, Polk, San Jacinto, Montgomery, Harris, Galveston, Waller, Fort Bend, Brazoria, Wharton, Matagorda, Jackson, Victoria, Calhoun, Refugio, Aransas, San Patricio, Nueces, Kleberg, Kenedy, Willacy, and Cameron.

3_____ *Louisiana Gulf Coast*—The following parishes of Louisiana: Vernon, Rapides, Avoyelles, Pointe Coupee, West Feliciana, East Feliciana, Tangipahoa, St. Helena, Washington, and all parishes south thereof; the following counties of Mississippi: Pearl River, Stone, George, Hancock, Harrison, and Jackson; and Mobile and Baldwin Counties, Ala.

3_____ *North Louisiana-Arkansas*—Arkansas and those parts of Louisiana, Mississippi, and Alabama not included in the Louisiana Gulf Coast district.

3_____ *New Mexico*—New Mexico.

4_____ *Rocky Mountain*—Montana, Idaho, Wyoming, Utah, and Colorado.

5_____ *West Coast*—Washington, Oregon, California, Nevada, Alaska, Arizona, and Hawaii.

RESERVES

The American Petroleum Institute Committee on Petroleum Reserves estimated proved reserves of crude oil in the United States as of December 31, 1965, to be 31,352,391,000 barrels, an increase of 361,881,000 barrels for the year. This is the first year since 1959 that a substantial increase in reserves was shown and this was the result of new discoveries, principally in offshore areas of California, Louisiana, and Alaska.

The estimate of crude-oil reserves includes only oil recoverable under existing economic and operating conditions.

Reserves of natural gas liquids are shown in the natural gas liquids chapter.

CRUDE PETROLEUM

SUPPLY AND DEMAND

The new supply of crude petroleum was derived primarily from domestic production, but the supply was augmented by imports. Crude imports represented 13.7 percent of the crude supply in 1965 compared with 13.6 percent in 1964. Under the mandatory import control program, which became effective in March 1959, imports of crude oil, unfinished oils, and refined products other than residual fuel oil are limited to 12.2 percent of the estimated total domestic production of crude oil and natural gas liquids in all States east of the Rocky Mountains. In States west of the Rocky Mountains, including Alaska and Hawaii, the import quota is based on the difference between the estimated available domestic supply and the estimated total demand. Overland receipts (imports from Canada and Mexico) are exempted from provisions of the program; however, before setting the allocations for crude and

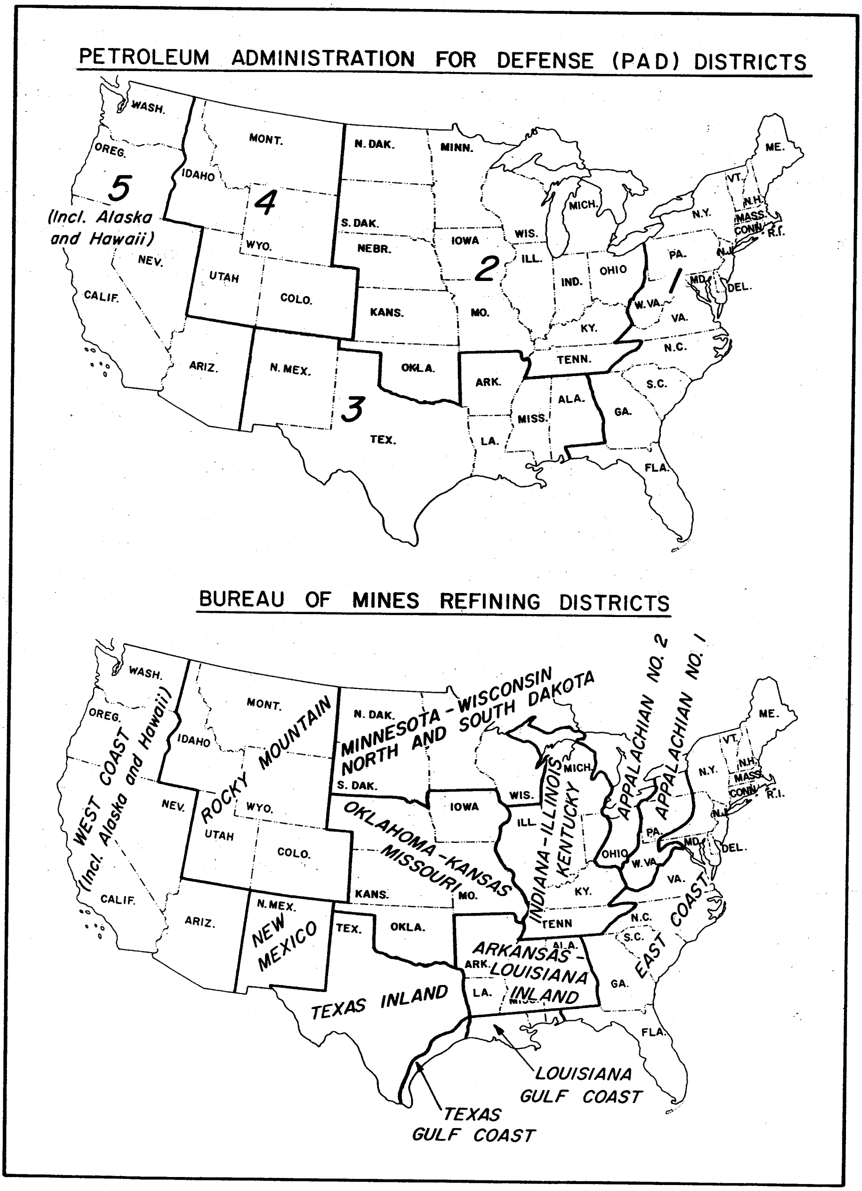

Figure 2.—Map of PAD Districts and Bureau of Mines Refining Districts.

Table 3.—Estimates of proved crude-oil reserves in the United States on Dec. 31, by States [1]
(Millon barrels)

State	1958	1959	1960	1961	1962	1963	1964	1965
Eastern States:								
Illinois	608	594	556	503	460	417	391	371
Indiana	71	74	66	62	61	63	61	57
Kentucky	126	136	129	116	109	100	118	108
Michigan	45	55	78	79	75	69	58	53
New York	36	34	32	28	23	18	14	12
Ohio	71	74	75	76	77	88	100	101
Pennsylvania	120	114	108	102	97	92	87	77
West Virginia	52	51	51	51	56	57	59	55
Total	1,129	1,132	1,095	1,017	958	904	888	834
Central and Southern States:								
Arkansas	318	313	302	281	247	225	205	201
Kansas	922	917	884	878	862	841	797	752
Louisiana [2]	4,044	4,660	4,785	4,931	5,087	5,089	5,162	5,246
Mississippi	379	389	407	401	388	385	357	360
Nebraska	69	81	86	100	94	84	71	71
New Mexico	894	1,026	1,084	1,090	1,065	1,011	957	895
North Dakota	314	382	431	413	404	389	377	395
Oklahoma	1,898	1,865	1,791	1,787	1,728	1,628	1,586	1,517
Texas	14,322	14,860	14,758	14,850	14,648	14,573	14,300	14,303
Total	23,160	24,493	24,528	24,731	24,523	24,225	23,812	23,740
Mountain States:								
Colorado	392	381	364	420	388	368	346	327
Montana	338	309	267	251	249	271	252	274
Utah	199	195	208	218	198	220	219	197
Wyoming	1,409	1,403	1,427	1,381	1,297	1,254	1,204	1,169
Total	2,338	2,288	2,266	2,270	2,132	2,113	2,021	1,967
Pacific Coast States: California [2]	3,866	3,763	3,659	3,615	3,648	3,600	4,125	4,567
Other States [3]	43	43	65	126	128	128	145	244
Total United States	30,536	31,719	31,613	31,759	31,389	30,970	30,991	31,352

[1] From reports of Committee on Petroleum Reserves, American Petroleum Institute. Includes crude oil that may be extracted by present methods from fields completely developed or sufficiently explored to permit reasonably accurate calculations. The change in reserves during any year represents total new discoveries, extensions, and revisions, minus production.
[2] Includes offshore reserves.
[3] Includes Alabama, Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee, Virginia, Washington, 1958–60, and Alaska 1959–65.

Table 4.—Supply and demand [1] for crude petroleum in the United States
(Thousand barrels)

	1961	1962	1963	1964	p 1965
Production	2,621,758	2,676,189	2,752,723	2,786,822	2,848,514
Imports [2]	381,548	411,039	412,660	438,643	452,040
Total new supply	3,003.306	3,087,228	3,165,383	3,225,465	3,300,554
Increase (+) or decrease (—) in stocks, end of year	+4,864	+7,347	—14,650	—7,304	—9,768
Demand:					
Domestic crude	2,614,919	2,669,398	2,767,129	2,795,130	2,856,918
Foreign crude	383,523	410,483	412,904	437,639	453,404
Total	2,998,442	3,079,881	3,180,033	3,232,769	3,310,322
Runs to stills:					
Domestic	2,604,127	2,659,826	2,758,168	2,785,895	2,847,821
Foreign	383,031	409,805	412,484	437,434	453,021
Exports [3]	3,227	1,790	1,698	1,363	1,097
Transfers to fuel oil:					
Distillate	851	1,198	807	755	773
Residual	3,854	3,797	3,305	3,720	3,950
Other fuel losses	3,352	3,465	3,571	3,602	3,660
Total	2,998,442	3,079,881	3,180,033	3,232,769	3,310,322

p Preliminary.
[1] For definition see footnote 3 at the beginning of this chapter.
[2] Bureau of Mines data.
[3] U.S. Department of Commerce data.

Table 5.—Supply of and demand for crude petroleum in the United States, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1964:													
Supply:													
Production	236,337	222,947	239,068	232,185	234,742	226,808	231,648	230,926	225,965	236,304	229,029	240,863	2,786,822
Imports [1]	39,635	32,209	36,945	33,091	35,968	34,387	43,820	40,743	36,853	39,224	34,102	31,666	438,643
Total new supply	275,972	255,156	276,013	265,276	270,710	261,195	275,468	271,669	262,818	275,528	263,131	272,529	3,225,465
Change in stocks, end of period:													
Domestic	—332	—43	+3,892	+7,447	+2,036	—1,607	—8,257	—9,066	—3,992	+1,922	+2,187	—2,495	—8,308
Foreign	+3,978	—902	+2,909	—398	+1,374	—4,485	+3,360	+645	—1,140	+531	—611	—4,257	+1,004
Demand:													
Domestic	236,669	222,990	235,176	224,738	232,706	228,415	239,905	239,992	229,957	234,382	226,842	243,358	2,795,130
Foreign	35,657	33,111	34,036	33,489	34,594	38,872	40,460	40,098	37,993	38,693	34,713	35,923	437,639
Runs to stills:													
Domestic	236,007	222,164	234,360	223,888	231,815	227,667	239,203	239,215	229,188	233,676	226,253	242,459	2,785,895
Foreign	35,586	33,120	33,996	33,527	34,675	38,832	40,427	40,071	37,969	38,689	34,661	35,881	437,484
Exports [2]	116	98	233	100	174	152	90	118	71	88	------	128	1,363
Transfers:													
Distillate	68	60	87	61	53	62	68	62	58	58	62	61	755
Residual	246	372	286	363	285	276	270	318	365	261	286	447	3,720
Losses	303	287	300	288	298	298	312	311	299	303	293	310	3,602
1965:p													
Supply:													
Production	240,946	218,612	243,763	236,844	238,253	232,440	237,606	240,180	222,529	244,122	239,635	253,584	2,848,514
Imports [1]	37,344	32,685	41,398	38,110	38,961	39,912	40,691	40,770	43,152	39,111	32,024	27,882	452,040
Total new supply	278,290	251,297	285,161	274,954	277,214	272,352	278,297	280,950	265,681	283,233	271,659	281,466	3,300,554
Change in stocks, end of period:													
Domestic	—1,554	—276	+6,411	+11,162	+3,429	—1,376	—9,586	—5,932	—5,904	+676	—3,301	—2,153	—8,404
Foreign	+1,662	+379	+2,884	+650	+267	—109	—1,899	+212	+623	+40	—1,818	—4,255	—1,364
Demand:													
Domestic	242,500	218,888	237,352	225,682	234,824	233,816	247,192	246,112	228,433	243,446	242,936	255,737	2,856,918
Foreign	35,682	32,306	38,514	37,460	38,694	40,021	42,590	40,558	42,529	39,071	33,842	32,137	453,404
Runs to stills:													
Domestic	241,431	218,033	236,728	224,879	234,242	233,094	246,043	245,571	227,740	242,641	242,223	255,196	2,847,821
Foreign	35,650	32,275	38,483	37,448	38,673	40,020	42,636	40,485	42,501	39,052	33,803	31,995	453,021
Exports [2]	89	45	3	187	------	68	421	------	------	182	94	8	1,097
Transfers:													
Distillate	65	65	89	63	56	61	61	66	63	63	59	62	773
Residual	640	496	258	273	244	291	302	232	358	267	293	296	3,950
Losses	307	280	305	292	303	303	319	316	300	312	306	317	3,660

p Preliminary.
[1] Bureau of Mines data.
[2] U.S. Department of Commerce.

Table 6.—Petroleum produced in the United States, by States [1]
(Thousand barrels unless otherwise stated)

	1961	1962	1963	1964	1965	1859–1965 total
Production:						
Alabama	6,931	7,473	9,175	8,498	8,064	77,007
Alaska	6,327	10,259	10,740	11,059	11,128	50,259
Arkansas	29,246	27,649	27,406	26,737	25,930	1,225,036
California	299,609	296,590	300,908	300,009	316,428	13,541,285
Colorado	46,759	42,477	38,283	34,755	33,511	792,387
Florida	374	419	464	620	1,464	9,876
Illinois	76,818	78,796	74,796	70,168	63,708	2,591,953
Indiana	11,500	12,077	11,902	11,283	11,481	376,765
Kansas	112,241	112,076	109,107	106,252	104,733	[2] 3,855,924
Kentucky	18,344	17,789	18,344	19,772	19,386	[3] 510,833
Louisiana	424,962	477,153	515,057	549,698	594,853	8,079,855
Michigan	18,901	17,114	15,972	15,601	14,728	[4] 523,875
Mississippi	54,688	55,713	58,619	56,777	56,183	967,540
Montana	30,906	31,648	30,870	30,647	32,778	522,419
Nebraska	24,369	24,894	21,846	19,113	17,216	248,239
Nevada	154	141	118	255	209	1,181
New Mexico	112,553	109,328	109,941	113,863	119,166	[5] 2,081,104
New York	1,658	1,589	1,679	1,874	1,632	[6] 204,461
North Dakota	23,652	25,181	25,030	25,731	26,350	230,698
Ohio	5,639	5,835	6,039	15,859	12,908	713,518
Oklahoma	193,081	202,732	201,962	202,524	203,441	[2] 9,229,616
Pennsylvania	5,643	5,302	5,083	5,113	4,922	[6] 1,247,551
Texas	939,191	943,328	977,835	989,525	1,000,749	28,673,930
Utah	33,118	31,029	33,435	28,575	25,298	[7] 271,514
West Virginia	2,760	3,470	3,350	3,370	3,530	482,123
Wyoming	141,937	135,847	144,407	138,752	138,314	2,617,638
Other States [8]	397	280	355	392	404	5,246
Total	2,621,758	2,676,189	2,752,723	2,786,822	2,848,514	79,131,833
Value at wells:						
Total thousand dollars	7,565,582	7,774,051	7,965,743	8,017,078	8,158,298	166,519,169
Average per barrel dollars	$2.89	$2.90	$2.89	$2.88	$2.86	$2.10

[1] For detailed figures by States, 1859–1935, see Minerals Yearbook, 1937, p. 1008.
[2] Oklahoma included with Kansas in 1905 and 1906.
[3] Includes Tennessee, 1883–1907.
[4] Figures represent 1925–65 production only; earlier years included with "Other States."
[5] Figures represent 1924–65 production only; earlier years included with "Other States."
[6] Early production in New York included with Pennsylvania.
[7] Figures represent 1946–65 production only; earlier years included with "Other States."
[8] Includes Alaska, 1912–33; Arizona, 1958–65; Arkansas 1920; Michigan, 1900–1919; Mississippi, 1933–35; Missouri, 1899–1911, 1913–16, 1919–23, 1932–65; New Mexico, 1913, 1919–23; South Dakota, 1955–65; Tennessee, 1916–65; Utah, 1907–11, 1920, 1924–41; Virginia, 1943–65; Washington, 1958–60.

unfinished oils in the States an estimate of probable overland receipts from Canada and Mexico are subtracted from the allocations. Vessel and aircraft fuels imported in bond for use as fuel outside the United States are also exempted from provisions of the program. All refineries of record are granted an allocation based on their refinery throughput with certain special provisions applying to refineries that imported crude oil during 1957, the base year for the program.

PRODUCTION

GENERAL.—Crude oil production in the United States averaged 7,804,000 barrels per day during 1965, or nearly 200,000 barrels per day more compared with the 7,614,000 barrels per day produced during 1964. Gains of nearly 124,000 barrels per day were made in Louisiana, primarily offshore, and an increase in production of crude oil in West Texas more than offset declines in some other areas of that State; hence, there was a gain of 38,200 barrels a day in Texas. The most significant change in 1965 occurred in California. A rise of 47,200 barrels a day in the production of crude oil during 1965 reversed the downtrend in that State. California's production, which had reached a peak of about a million barrels per day in 1953, receded slowly after that year and the downturn did not level off until 1962. Greatly increased production of crude oil resulting from the water flooding of the East Wilmington Field at Long Beach and offshore development is expected to push production in California even higher in 1966. Additional data on production, by States, are presented in tables 6 and 7 of this chapter and in volume III of the 1965 Minerals Yearbook.

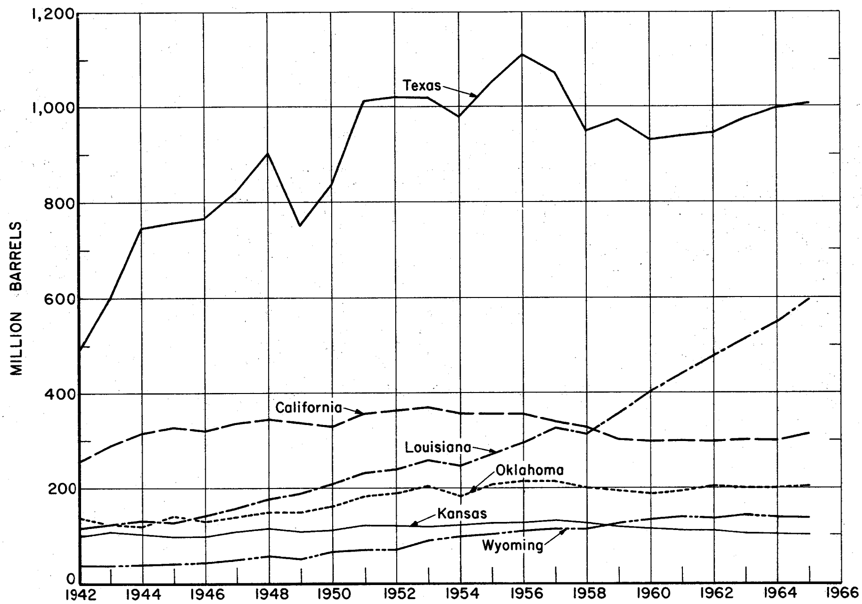

Figure 3.—Production of crude petroleum in the United States, 1942–65, by principal producing States.

Table 7.—Production of crude petroleum in the United States in 1964–65, by States and months [1]

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1964 (final):													
Alabama	738	682	773	688	705	713	747	759	667	687	669	670	8,498
Alaska	945	885	859	913	949	916	941	941	914	946	909	941	11,059
Arkansas	2,300	2,156	2,314	2,202	2,266	2,224	2,229	2,250	2,162	2,231	2,169	2,234	26,737
California, total [2]	25,201	23,401	25,201	24,600	25,201	24,601	25,201	25,201	24,901	25,801	24,900	25,800	300,009
Coastal region	5,353	4,992	5,339	5,185	5,433	5,325	5,493	5,515	5,503	5,631	5,521	5,689	64,979
Los Angeles	8,533	7,960	8,524	8,236	8,488	8,278	8,557	8,617	8,465	8,791	8,595	8,983	102,022
San Joaquin Valley region	11,315	10,449	11,338	11,179	11,285	10,998	11,151	11,069	10,933	11,379	10,784	11,128	133,008
Colorado [3]	3,093	2,885	3,024	2,885	2,989	2,850	2,815	2,919	2,746	2,815	2,780	2,954	34,755
Florida	38	35	36	33	41	47	57	56	54	63	81	79	620
Illinois	6,251	5,720	6,037	5,923	5,851	5,860	6,032	5,813	5,752	5,754	5,497	5,678	70,168
Indiana	975	983	953	911	1,009	892	957	922	929	886	872	994	11,283
Kansas [4]	9,317	8,591	9,194	8,921	8,683	8,567	8,944	8,753	8,674	9,003	8,579	9,026	106,252
Kentucky	1,799	1,700	1,839	1,542	1,661	1,582	1,641	1,581	1,602	1,641	1,562	1,622	19,772
Louisiana, total [5]	47,273	44,526	47,274	46,175	45,625	43,976	45,075	45,075	43,976	45,075	46,175	49,473	549,698
Gulf Coast	42,173	40,188	42,669	41,677	41,181	39,692	40,684	40,684	39,692	40,932	41,923	44,656	496,151
Rest of State	5,100	4,338	4,605	4,498	4,444	4,284	4,391	4,391	4,284	4,143	4,252	4,817	53,547
Michigan [6]	1,361	1,243	1,311	1,312	1,293	1,307	1,330	1,289	1,279	1,313	1,254	1,309	15,601
Mississippi	4,883	4,656	4,996	4,712	4,656	4,769	4,656	4,656	4,542	4,883	4,485	4,883	56,777
Montana [7]	2,392	2,561	2,649	2,526	2,600	2,599	2,528	2,562	2,539	2,676	2,456	2,559	30,647
Nebraska	1,701	1,567	1,644	1,568	1,605	1,529	1,586	1,625	1,548	1,605	1,548	1,587	19,113
New Mexico, total [8]	9,564	8,995	9,792	9,337	9,565	9,109	9,451	9,223	9,337	9,678	9,678	10,134	113,863
Southeastern	8,621	8,206	8,933	8,517	8,725	8,413	8,621	8,621	8,517	8,829	8,725	9,142	103,870
Northwestern	943	789	859	820	840	696	830	602	820	849	953	992	9,993
New York	201	183	158	152	153	156	155	145	142	147	139	143	1,874
North Dakota [9]	2,271	2,362	2,127	2,068	1,621	1,953	2,122	2,184	2,229	2,335	2,207	2,252	25,731
Ohio	1,031	1,332	1,348	1,411	1,396	1,316	1,380	1,332	1,396	1,364	1,268	1,285	15,859
Oklahoma	17,222	16,066	17,449	17,233	17,468	16,662	17,158	16,690	16,135	17,244	16,262	16,935	202,524
Pennsylvania	475	402	481	538	381	395	409	395	417	426	387	407	5,113
Texas, total	83,118	78,162	85,107	82,067	84,114	81,138	82,175	82,127	80,160	84,095	81,166	86,096	989,525
Gulf Coast	16,100	15,142	16,483	15,908	16,292	15,717	15,908	15,908	15,525	16,291	15,717	16,674	191,665
West Texas	37,262	35,044	38,149	36,819	37,706	36,375	36,819	36,819	35,931	37,706	36,375	38,592	443,597
East Texas field	3,652	3,434	3,739	3,609	3,695	3,565	3.608	3.608	3,521	3,695	3,563	3,782	43,471
Rest of State	26,104	24,542	26,736	25,731	26,421	25,481	25,840	25,792	25,183	26,403	25,511	27,048	310,792
Utah [10]	2,573	2,429	2,543	2,543	2,457	2,400	2,457	2,429	2,172	2,229	2,143	2,200	28,575
West Virginia	275	247	265	284	265	295	300	271	275	301	279	313	3,370
Wyoming	11,291	11,125	11,643	11,585	12,139	10,902	11,246	11,668	11,357	13,046	11,513	11,237	138,752
Other States	49	53	51	56	49	50	56	60	60	60	51	52	[11] 647
Total: 1964	236,337	222,947	239,068	232,185	234,742	226,808	231,648	230,926	225,965	236,304	229,029	240,863	2,786,822
1963	226,420	212,437	234.289	228.270	234,499	226,853	235,144	236,830	225,207	233,610	226,321	232,843	2,752,723
Daily average, 1964	7,624	7,688	7,712	7,739	7,572	7,560	7,473	7,449	7,532	7,623	7,634	7,770	7,614
Pennsylvania grade (included above)	1,111	961	1,031	1,110	922	959	987	906	954	995	937	1,003	11,876

See footnotes at end of table.

Table 7.—Production of crude petroleum in the United States in 1964–65, by States and months [1]—Continued

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1965:													
Alabama	687	658	684	726	665	468	423	734	765	779	737	738	8,064
Alaska	944	849	941	912	943	916	930	947	912	943	914	977	11,128
Arkansas	2,216	2,016	2,234	2,166	2,203	2,137	2,220	2,230	2,126	2,226	2,047	2,109	25,930
California, total [2]	25,722	23,576	26,232	25,577	26,725	25,927	26,853	26,829	26,314	27,816	26,953	27,904	316,428
Costal region	5,614	5,094	5,678	5,361	5,607	5,473	5,504	5,424	5,286	5,879	5,674	5,792	66,386
Los Angeles	8,957	8,079	9,107	8,708	9,128	8,761	9,008	9,047	8,905	9,402	9,209	9,580	107,891
San Joaquin Valley region	11,151	10,403	11,447	11,508	11,990	11,693	12,341	12,358	12,123	12,535	12,070	12,532	142,151
Colorado [3]	2,948	2,658	2,942	2,814	2,895	2,765	2,814	2,790	2,673	2,748	2,681	2,783	33,511
Florida	78	75	82	90	110	119	125	122	140	173	168	182	1,464
Illinois	5,418	4,830	5,627	5,394	5,435	5,383	5,395	5,399	5,194	5,260	4,964	5,409	63,708
Indiana	914	802	1,002	964	1,107	956	958	965	928	968	903	1,014	11,481
Kansas [4]	8,826	8,023	9,077	8,785	8,750	8,357	8,880	8,884	8,569	9,018	8,695	8,869	104,733
Kentucky	1,646	1,422	1,691	1,532	1,659	1,633	1,559	1,642	1,592	1,625	1,636	1,749	19,386
Louisiana, total [5]	49,996	45,203	50,004	48,241	49,201	48,462	50,029	50,144	39,611	53,863	53,981	56,118	594,853
Gulf Coast	45,153	40,873	45,231	43,735	44,584	43,988	45,438	45,532	35,191	49,110	49,342	51,360	539,537
Rest of State	4,843	4,330	4,773	4,506	4,617	4,474	4,591	4,612	4,420	4,753	4,639	4,758	55,316
Michigan [6]	1,217	1,126	1,260	1,226	1,235	1,205	1,245	1,220	1,272	1,238	1,227	1,257	14,728
Mississippi	4,769	4,563	4,723	4,577	4,687	4,541	4,701	4,719	4,512	5,041	4,612	4,738	56,183
Montana [7]	2,556	2,361	2,667	2,551	2,707	2,664	2,838	2,927	2,817	2,939	2,903	2,848	32,778
Nebraska	1,596	1,429	1,563	1,475	1,480	1,411	1,429	1,428	1,354	1,385	1,343	1,323	17,216
New Mexico, total [8]	10,319	9,370	10,313	9,889	10,127	9,618	9,860	9,841	9,576	10,086	9,836	10,331	119,166
Southeastern	9,366	8,498	9,315	8,905	9,148	8,685	8,910	8,908	8,652	9,095	8,839	9,266	107,587
Northwestern	953	872	998	984	979	933	950	933	924	991	997	1,065	11,579
New York	133	127	145	136	133	130	144	141	133	133	138	139	1,632
North Dakota [9]	2,352	2,116	2,375	2,367	2,363	2,219	2,367	2,372	1,625	1,576	2,165	2,453	26,350
Ohio	1,148	1,103	1,059	1,098	1,039	1,057	1,096	1,127	1,095	1,053	1,002	1,031	12,908
Oklahoma	17,011	15,553	17,588	17,464	17,368	16,466	16,031	17,322	17,183	16,530	16,667	18,258	203,441
Pennsylvania	365	353	415	413	414	419	437	435	437	421	402	411	4,922
Texas, total	85,126	77,173	84,860	82,952	82,842	82,166	84,066	84,251	80,721	84,990	82,519	89,083	1,000,749
Gulf Coast	15,902	14,280	15,833	15,512	15,529	15,447	15,926	15,940	15,084	16,187	15,442	16,670	187,752
West Texas	39,023	35,361	38,975	38,075	38,215	37,715	38,658	38,621	37,363	39,527	38,646	40,493	460,672
East Texas field	3,459	3,160	3,485	3,401	3,310	3,286	3,387	3,391	3,251	3,468	3,212	3,694	40,504
Rest of State	26,742	24,372	26,567	25,964	25,788	25,718	26,095	26,299	25,023	25,808	25,219	28,226	311,821
Utah [10]	2,203	2,037	2,245	2,123	2,084	2,143	2,113	2,140	2,063	2,135	2,019	1,993	25,298
West Virginia	280	267	345	279	283	298	283	298	305	295	288	309	3,530
Wyoming	12,434	10,882	13,643	13,048	11,749	10,935	10,764	11,226	10,547	10,816	10,769	11,501	138,314
Other States	42	40	46	45	49	45	46	47	65	65	66	57	[12] 613
Total: 1965	240,946	218,612	243,763	236,844	238,253	232,440	237,606	240,180	222,529	244,122	239,635	253,584	2,848,514
1964	236,337	222,947	239,068	232,185	234,742	226,808	231,648	230,926	225,965	236,304	229,029	240,863	2,786,822
Daily average, 1965	7,773	7,808	7,863	7,895	7,686	7,748	7,665	7,748	7,418	7,875	7,988	8,180	7,804
Pennsylvania grade (included above)	916	888	1,034	976	964	997	1,011	1,023	1,013	978	958	1,004	11,762

[1] Includes field condensate.
[2] Conservation Committee of California Oil Producers.
[3] Colorado Oil Conservation Commission.
[4] Kansas Geological Survey.
[5] Louisiana Conservation Commission.
[6] Michigan Department of Conservation.
[7] Montana Oil Conservation Board.
[8] New Mexico Oil and Gas Conservation Commission.
[9] North Dakota Geological Survey.
[10] Utah Oil and Gas Conservation Commission.
[11] Includes Arizona (64), Missouri (65), Nevada (255), South Dakota (247), Tennessee (10), and Virginia (6).
[12] Includes Arizona (97), Missouri (73), Nevada (209), South Dakota (219), Tennessee (11), and Virginia (4).

Table 8.—Percentage of total crude petroleum produced in the United States, by States

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Texas	42.3	41.0	38.4	37.8	36.0	35.8	35.2	35.5	35.5	35.1
Louisiana	11.4	12.6	12.8	14.1	15.6	16.2	17.8	18.7	19.7	20.9
California	13.4	13.0	12.8	12.0	11.8	11.4	11.1	10.9	10.8	11.1
Oklahoma	8.2	8.2	8.2	7.7	7.5	7.4	7.6	7.3	7.3	7.1
Wyoming	4.0	4.2	4.7	4.9	5.2	5.4	5.1	5.2	5.0	4.9
New Mexico	3.4	3.6	4.0	4.1	4.2	4.3	4.1	4.0	4.1	4.1
Kansas	4.7	4.7	4.9	4.6	4.4	4.3	4.2	4.0	3.8	3.7
Illinois	3.1	2.9	3.3	3.0	3.0	2.9	2.9	2.7	2.5	2.3
Mississippi	1.6	1.5	1.6	1.9	2.0	2.1	2.1	2.1	2.0	1.9
Colorado	2.2	2.1	2.0	1.8	1.9	1.8	1.6	1.4	1.2	1.2
Montana	.8	1.0	1.1	1.2	1.2	1.1	1.2	1.1	1.1	1.2
Arkansas	1.1	1.2	1.2	1.0	1.2	1.2	1.0	1.0	1.0	.9
Kentucky	.7	.7	.7	1.1	.8	.7	.7	.7	.7	.7
Michigan	.4	.4	.4	.4	.6	.7	.6	.6	.6	.5
Other States	2.7	2.9	3.9	4.4	4.6	4.7	4.8	4.8	4.7	4.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

WELLS

Well-drilling activity in 1965 was at its lowest level since 1949. The number of wells drilled, exclusive of service wells, was 39,501 for the year, a decline of 3,462 wells. Only three States had any sizeable increase in the number of wells drilled. These were New York, an increase of 207; Pennsylvania, 110; and Montana, 88. Among the 24 States where drilling activity declined were Kansas, 1,084; Ohio, 588; Texas, 385; and New Mexico, 351.

The average footage drilled per well in 1965 was 4,380 feet compared with 4,198 feet in 1964. This average varies from a low of 1,080 feet for New York to a 10,526-foot depth for wells drilled offshore of Louisiana.

The number of producing oil wells in the United States as of December 31, 1965, was 589,203. For 1964 this figure was 588,225.

CONSUMPTION

The total demand for crude oil in the United States in 1965 was 9,069,000 barrels daily. Domestic crude oil supplied 7,827,000 barrels of the daily requirements, and foreign crude oil 1,242,000 barrels. The increase in demand for the year was 236,000 barrels daily—190,000 barrels daily for domestic crude oil and 46,000 barrels for crude oil of foreign origin.

Runs to stills.—Crude runs to stills in 1965 averaged 9,043,000 barrels daily, an increase of 236,000 barrels daily. Domestic crude runs were 7,802,000 barrels daily and foreign crude runs 1,241,000 barrels daily.

Demand by States of Origin.—Distribution of domestic oil by refining States and districts can be analyzed from receipts of crude at refineries. When long-distance shipments are involved, various crudes may be mixed in transit or storage and identification by origin may be only approximate.

TRANSPORTATION AND DISTRIBUTION

CRUDE OIL

A complex transportation system consisting of pipelines, tankers, barges, tank cars, and tank trucks moves the crude petroleum to the refineries for processing. Refineries received 74.9 percent of their supply of crude oil by pipeline, 23.9 percent by water, and the remainder by tank cars and tank trucks in 1965.

The largest market for petroleum products in the United States (40 percent of the total) is found in that group of eastern seaboard States defined as PAD district I. The second largest market is found in the Midwest in district II. Most of the domestic supply of crude oil is obtained from PAD district III, which includes Texas, Louisiana, New Mexico, Arkansas, and Mississippi. Interdistrict shipments from district III amounted to nearly 4.2 million barrels a day and nearly 2.6 million or 62 percent was destined for district I during 1965. District II received 1.4 million barrels a day from district III.

The Bureau of Mines collects data on receipts of domestic and foreign crude petroleum at refineries in the United States. These receipts include the crude runs to

Table 9.—Production and reserves of crude petroleum in leading fields in the United States

(Thousand barrels)

Field[1]	State	1963	1964	Total since discovery[2]	Estimated reserves
East Texas	Texas	40,055	40,851	3,665,761	1,444,239
Wilmington	California	35,350	37,051	1,050,539	1,049,371
Sho-Vel-Tum	Oklahoma	26,660	28,769	712,123	121,747
Seeligson (all fields)	Texas	21,926	27,580	313,460	186,540
Kelly-Snyder	do	16,832	27,199	350,338	561,102
Goldsmith	do	13,465	26,113	372,594	87,406
Bay Marchand, block	Louisiana	25,056	25,298	151,403	444,213
Wasson	Texas	14,174	25,276	430,659	219,341
Panhandle	do	25,052	24,487	1,135,338	511,646
Caillou Island	Louisiana	22,186	23,500	263,295	236,705
Midway-Sunset	California	18,270	22,286	970,177	197,890
South Pass, block 24	Louisiana	19,968	21,576	233,862	516,138
West Delta block 30	do	20,134	21,103	101,090	298,910
Ward-Estes North	Texas	19,192	20,227	207,787	85,213
Sprayberry Trend	do	11,880	19,865	204,244	75,900
Huntington Beach	California	15,785	19,353	749,981	155,931
Timbalier Bay	Louisiana	16,876	19,037	135,412	164,588
South Pass, block 27	do	16,822	18,323	91,166	219,834
Slaughter	Texas	10,865	16,676	323,504	116,496
Elk Basin	Montana, Wyoming	18,702	16,351	288,452	111,548
Hawkins	Texas	9,002	14,891	311,920	214,031
Midland Farms (all)	do	9,051	14,270	116,504	95,315
Kern River	California	9,772	14,034	407,513	207,057
Headlee and North	Texas	13,657	13,938	53,048	148,604
Golden Trend	Oklahoma	14,292	13,544	296,860	63,140
Tom O'Connor	Texas	8,083	12,945	294,586	156,087
Hastings, East and West	do	7,895	12,900	355,156	144,844
San Ardo	California	9,657	12,522	157,511	108,984
Lake Barre	Louisiana	11,634	12,414	88,709	161,291
Rangeley	Colorado	15,342	12,355	376,748	223,252
Sand Hills	Texas	8,019	12,292	123,789	73,211
Burbank	California	13,417	12,017	447,226	52,774
Grand Isle block 16	Louisiana	10,584	11,743	52,961	122,039
Cowden (and Foster and Johnson)	Texas	7,658	11,530	216,911	103,089
McElroy	do	7,773	11,502	229,796	120,204
Vacuum	New Mexico	11,171	11,361	131,751	153,249
TXL	Texas	6,744	11,284	195,416	89,584
Swanson River	Alaska	11,163	11,056	50,216	149,680
Main Pass, block 69	Louisiana	10,072	10,946	91,155	208,845
Fullerton (all)	Texas	6,885	10,824	179,519	95,481
Borregos	do	6,022	10,823	55,444	84,556
Aneth	Utah	16,954	10,816	183,174	268,826
Ventura	California	11,576	10,792	704,790	110,164
Keystone	Texas	7,457	10,512	207,243	95,957
Cowden, North	do	7,522	9,828	190,654	59,346
Katy, North	do	9,452	9,734	173,095	126,905
Sooner-Trend (Dover-Hennessey)	Oklahoma	8,667	9,680	39,643	61,000
Lake Washington	Louisiana	10,242	9,661	114,850	185,150
Coalinga East	California	5,724	9,520	358,686	33,834
Webster	Texas	5,777	9,393	283,393	166,607
Loudon	Illinois	12,612	9,163	312,106	37,894
West Bay	Louisiana	8,299	9,122	88,856	121,144
Bakke	Texas	5,915	9,066	42,042	32,958
Coalinga Nose	California	10,147	8,971	95,170	102,045
Salt Creek	Wyoming	9,004	8,968	428,669	81,331
Howard Glasscock	Texas	7,111	8,961	248,176	37,546
West Ranch	do	5,293	8,925	178,753	100,058
Diamond M	do	5,785	8,918	129,833	365,167
Pegasus	do	4,348	8,916	76,117	60,883
Agua Dulce-Stratton	do	6,768	8,897	190,451	64,549
Thompson (all)	do	5,110	8,801	268,228	76,772
Conroe	do	5,526	8,750	423,359	181,205
High Island	do	10,181	8,615	103,108	71,892
Old Illinois	Illinois	11,030	8,593	622,518	52,482
Wichita County Regular	Texas	-----	8,555	458,091	60,002
Tates	do	4,121	8,510	497,141	154,734
Means and North	do	5,127	8,392	81,348	48,652
Bayou Sale	Louisiana	7,283	8,365	103,342	96,668
Oregon basin	Wyoming	6,695	8,284	131,218	55,782
Buena Vista	California	8,282	8,160	532,451	82,625
Dune	Texas	5,368	7,961	50,355	101,110
Scipio	Michigan	5,296	7,860	36,494	43,506
Russell and North	Texas	4,990	7,836	71,347	58,653
Van & Van Shallow	do	4,850	7,814	318,976	87,024
Cogdell	do	5,097	7,734	97,214	59,649
Belridge South	California	7,385	7,672	117,073	84,740
Bay St. Elaine	Louisiana	7,705	7,431	79,075	73,925

[1] Fields under 7 million barrels not shown for current year.
[2] Includes revisions, if any.

Source: Oil and Gas Journal.

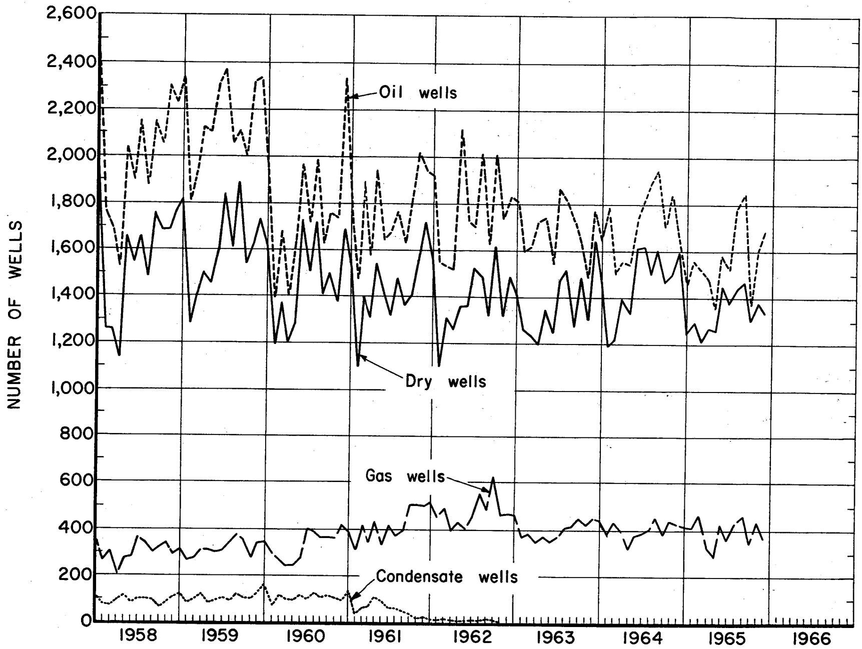

Figure 4.—Wells drilled for oil and gas in the United States, 1958–65, by months.

Table 10.—Well completions in the United States, by months [1]

Wells	January	February	March	April	May	June	July	August	September	October	November	December	Total Number	Total Percent
1964:														
Oil	1,647	1,788	1,500	1,554	1,542	1,730	1,819	1,892	1,945	1,705	1,836	1,662	20,620	48.0
Gas [2]	441	386	437	397	322	375	389	400	455	386	440	427	4,855	11.3
Dry	1,450	1,191	1,222	1,400	1,332	1,611	1,617	1,505	1,603	1,469	1,494	1,594	17,488	40.7
Total	3,538	3,365	3,159	3,351	3,196	3,716	3,825	3,797	4,003	3,560	3,770	3,683	42,963	100.0
1965:														
Oil	1,455	1,554	1,522	1,478	1,354	1,583	1,521	1,784	1,844	1,375	1,606	1,685	18,761	47.5
Gas [2]	416	410	461	326	285	424	360	430	460	347	436	369	4,724	12.0
Dry	1,244	1,291	1,211	1,267	1,257	1,450	1,378	1,435	1,464	1,303	1,378	1,338	16,016	40.5
Total	3,115	3,255	3,194	3,071	2,896	3,457	3,259	3,649	3,768	3,025	3,420	3,392	39,501	100.0

[1] Excludes service wells.
[2] Includes condensate wells.
Source: Oil and Gas Journal.

Table 11.—Well completions in the United States, by States and districts [1]

State and district	1964				1965			
	Oil	Gas [2]	Dry	Total	Oil	Gas [2]	Dry	Total
Alabama	17	-----	32	49	13	-----	23	36
Alaska	4	2	15	21	11	13	4	28
Arizona	-----	6	34	40	-----	-----	33	33
Arkansas	167	48	206	421	100	44	190	334
California	1,616	123	550	2,289	1,622	62	484	2,168
Colorado	99	70	395	564	113	53	410	576
Florida	4	-----	8	12	15	-----	11	26
Georgia	-----	-----	2	2	-----	-----	-----	-----
Idaho	-----	-----	1	1	-----	-----	-----	-----
Illinois	665	17	801	1,483	602	8	608	1,218
Indiana	224	2	321	547	140	10	312	462
Iowa	-----	-----	12	12	-----	-----	15	15
Kansas	2,259	219	1,700	4,178	1,466	206	1,422	3,094
Kentucky	485	194	655	1,334	379	177	559	1,115
Louisiana:								
North	1,486	228	1,204	2,918	1,239	299	1,090	2,628
South	663	220	682	1,565	753	187	674	1,614
Offshore	393	90	364	847	421	56	380	857
Total Louisiana	2,542	538	2,250	5,330	2,413	542	2,144	5,099
Maryland	-----	-----	1	1	-----	1	1	2
Michigan	84	53	385	522	44	36	288	368
Mississippi	188	18	513	719	201	15	523	739
Missouri	-----	-----	12	12	-----	-----	-----	-----
Montana	142	16	251	409	194	10	293	497
Nebraska	136	2	320	458	93	1	327	421
Nevada	2	-----	6	8	6	-----	9	15
New Jersey	-----	-----	1	1	-----	-----	-----	-----
New Mexico:								
West	48	291	85	424	30	243	66	339
East	672	49	318	1,039	465	60	248	773
Total New Mexico	720	340	403	1,463	495	303	314	1,112
New York	123	45	57	225	375	18	39	432
North Carolina	-----	-----	-----	-----	-----	-----	2	2
North Dakota	113	-----	162	275	91	-----	148	239
Ohio	737	288	1,452	2,477	715	263	911	1,889
Okahloma	2,256	464	1,286	4,006	2,183	549	1,277	4,009
Oregon	-----	-----	2	2	-----	-----	4	4
Pennsylvania	370	358	148	876	572	286	128	986
South Dakota	3	-----	23	26	4	-----	29	33
Tennessee	-----	-----	19	19	4	3	13	20
Texas:								
Gulf Coast	762	392	907	2,061	649	414	955	2,018
West	2,129	155	867	3,151	1,965	207	833	3,005
East	407	123	359	889	290	113	337	740
Other districts	3,449	658	2,517	6,624	3,279	609	2,689	6,577
Total Texas	6,747	1,328	4,650	12,725	6,183	1,343	4,814	12,340
Utah	50	19	109	178	71	27	71	169
Vermont	-----	-----	-----	-----	-----	-----	1	1
Virginia	1	2	2	5	1	1	1	3
Washington	-----	-----	5	5	-----	-----	1	1
West Virginia	411	652	170	1,233	257	695	115	1,067
Wyoming	455	51	529	1,035	398	58	492	948
Total United States	20,620	4,855	17,488	42,963	18,761	4,724	16,016	39,501

[1] Excludes service wells.
[2] Includes condensate wells.
Source: Oil and Gas Journal.

Table 12.—Producing oil wells in the United States and average production per well per day, by States

State	Producing oil wells			
	1964		1965	
	Approximate number of producing oil wells, Dec. 31	Average production per well per day (barrels)[1]	Approximate number of producing oil wells, Dec. 31	Average production per well per day (barrels)[1]
Alabama	519	45.5	518	42.6
Alaska	56	549.4	57	539.6
Arkansas	6,018	12.1	6,014	11.8
California	40,916	20.2	41,031	21.2
Colorado	1,981	47.3	1,938	46.9
Illinois	29,500	6.4	29,017	6.0
Indiana	5,381	5.4	[2]5,275	5.9
Kansas	46,715	6.2	47,354	6.1
Kentucky	15,226	3.6	15,600	3.4
Louisiana:				
Gulf Coast	15,114	91.3	15,738	96.0
Northern	14,338	10.7	14,441	10.5
Total Louisiana	29,452	52.6	30,179	54.7
Michigan	4,151	10.2	4,036	9.9
Mississippi	2,580	59.0	2,513	60.4
Montana	3,329	24.0	3,799	25.2
Nebraska	1,711	30.4	1,611	28.4
New Mexico:				
Southeastern	15,651	18.6	16,061	18.6
Northwestern	1,919	14.4	1,939	16.4
Total New Mexico	17,570	18.1	18,000	18.4
New York	[2]12,526	0.4	[2]12,304	0.4
North Dakota	1,881	38.0	1,983	37.4
Ohio	13,752	3.1	13,947	2.6
Oklahoma	80,511	6.8	80,947	6.9
Pennsylvania	53,065	0.3	52,731	0.3
South Dakota	24	28.1	28	23.1
Texas:[3]				
Gulf Coast	19,562	26.7	19,489	26.3
East Texas Field	18,904	6.2	18,489	5.9
West Texas	67,068	18.2	66,773	18.9
Other districts	93,585	9.0	93,173	9.1
Total Texas	199,119	13.6	197,924	13.8
Utah	840	93.2	841	82.5
West Virginia	13,205	0.7	13,225	0.7
Wyoming	8,019	49.1	8,093	47.0
Other States:				
Arizona	8	20.6	10	29.5
Florida	19	109.3	38	140.7
Missouri	100	1.7	142	1.7
Nevada	[2]5	154.8	[2]9	81.8
Tennessee	38	0.7	33	0.8
Virginia	8	2.3	6	1.6
Total other States	[2]178	15.8	[2]238	24.5
Total United States	588,225	12.9	589,203	13.3

[1] Based on the average number of wells during the year.
[2] Compiled by Bureau of Mines, all other number of producing oil wells furnished by State agencies.
[3] Division of the Texas Railroad Commission.

Table 13.—Daily average total demand for crude petroleum in the United States, 1964–65, by State of origin and months

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1964:													
Alabama	23.2	22.4	23.6	22.6	30.7	13.9	32.9	12.8	33.0	9.5	36.9	18.0	23.2
Alaska	27.5	33.4	22.7	28.1	39.6	28.9	30.2	29.0	30.7	26.3	32.9	27.5	29.6
Arkansas	73.1	71.8	75.0	77.9	73.7	76.4	74.0	73.6	70.9	70.6	73.4	71.7	73.5
California	828.4	809.0	880.5	800.2	823.1	845.7	788.2	832.9	821.8	824.7	843.5	790.5	824.0
Colorado	103.5	110.3	81.3	96.6	73.4	107.2	94.3	105.5	92.4	94.2	91.1	95.2	95.3
Florida	0.7	------	------	3.2	------	3.6	------	3.3	0.2	3.3	3.4	------	1.5
Illinois	195.9	195.5	196.9	181.1	162.6	161.7	207.5	188.3	210.7	186.8	203.0	199.8	190.8
Indiana	32.2	31.5	29.8	29.0	34.1	29.9	29.2	29.3	34.1	30.1	28.5	30.7	30.7
Kansas	302.4	300.7	285.7	277.3	280.9	318.7	314.4	278.4	285.2	267.9	288.8	285.1	290.4
Kentucky	52.5	58.3	58.7	42.7	64.9	50.7	50.5	54.6	50.8	59.9	50.5	52.8	53.9
Louisiana	1,491.7	1,504.7	1,506.3	1,547.2	1,500.9	1,504.0	1,503.8	1,423.9	1,495.5	1,384.7	1,514.2	1,610.8	1,498.8
Michigan	51.4	42.6	39.3	45.1	33.9	45.8	44.0	40.7	45.8	40.8	43.1	40.0	42.7
Mississippi	159.7	149.1	173.6	145.8	140.9	159.3	151.4	150.2	144.3	164.0	150.9	162.7	154.4
Montana	76.7	88.3	76.7	83.5	66.9	99.2	76.1	83.7	88.2	90.4	82.0	93.5	83.7
Nebraska	67.5	56.7	60.9	39.6	46.0	56.9	48.1	36.4	55.7	48.4	59.5	63.7	53.3
New Mexico	322.0	327.0	323.9	313.4	274.3	329.8	297.5	337.3	309.6	310.1	325.3	343.1	317.7
New York	6.9	6.3	5.2	5.1	4.9	5.2	4.9	4.7	4.7	4.7	4.6	4.6	5.2
North Dakota	70.8	81.0	71.3	75.3	39.9	65.9	67.6	75.5	76.0	69.3	71.1	75.9	69.9
Ohio	33.7	34.8	34.9	56.7	47.2	46.1	41.4	45.5	44.1	46.4	41.3	42.2	42.9
Oklahoma	571.2	537.8	547.2	545.1	588.3	502.9	604.5	566.1	546.9	573.7	557.6	550.8	558.0
Pennsylvania	16.4	13.0	19.3	15.7	15.3	15.8	11.1	11.1	14.1	14.0	9.2	15.7	14.2
Texas	2,710.0	2,756.5	2,606.2	2,620.2	2,675.6	2,648.6	2,789.4	2,860.9	2,726.5	2,764.4	2,617.9	2,833.4	2,717.9
Utah	68.7	94.1	86.6	85.1	75.2	81.9	80.1	78.6	75.5	60.5	74.2	73.1	77.7
West Virginia	9.5	8.4	8.8	9.6	7.9	6.6	7.9	7.2	9.2	7.7	9.1	10.8	8.6
Wyoming	337.3	354.3	370.3	343.3	405.0	407.5	388.0	410.3	397.3	406.4	347.8	357.0	377.3
Other States	1.6	1.8	1.7	1.9	1.5	1.7	1.8	1.9	2.1	1.9	1.7	1.7	[1]1.8
Total domestic crude	7,634.5	7,689.3	7,586.4	7,491.3	7,506.7	7,613.9	7,738.8	7,741.7	7,665.3	7,560.7	7,561.5	7,850.3	7,637.0
Foreign crude	1,150.2	1,141.8	1,097.9	1,116.3	1,115.9	1,295.7	1,305.2	1,293.5	1,266.4	1,248.2	1,157.0	1,158.8	1,195.7
Grand total 1964	8,784.7	8,831.1	8,684.3	8,607.6	8,622.6	8,909.6	9,044.0	9,035.2	8,931.7	8,808.9	8,718.5	9,009.1	8,832.7
Pennsylvania grade (included above)	38.4	32.2	36.7	34.8	32.0	31.2	28.5	26.0	32.4	30.3	27.6	34.3	32.0

Table 13.—Daily average total demand for crude petroleum in the United States, 1964–65, by State of origin and months—Continued

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1965:													
Alabama	25.3	12.4	28.9	26.0	16.8	8.3	21.8	21.7	24.7	31.8	24.3	25.5	22.4
Alaska	33.6	27.8	36.3	28.8	24.1	32.8	32.0	32.4	32.6	23.6	31.7	27.4	30.3
Arkansas	72.8	76.9	64.3	75.9	72.3	73.6	74.3	73.4	71.7	67.1	67.1	71.4	71.7
California	850.2	817.4	795.1	834.6	847.7	833.9	941.5	838.1	889.3	916.8	971.7	860.5	866.6
Colorado	89.7	110.4	87.3	84.9	107.3	84.6	91.2	105.3	84.2	84.3	82.3	91.7	91.9
Florida	3.5	3.0	3.9	2.7	2.9	0.3	7.6	3.0	0.1	4.3	5.0	3.9	3.3
Illinois	194.7	175.0	158.0	137.9	170.1	185.8	182.0	181.4	184.2	170.3	174.4	176.0	174.2
Indiana	31.6	27.8	30.0	31.9	36.9	30.3	34.8	30.4	31.7	28.1	32.7	32.8	31.6
Kansas	292.8	275.2	305.7	286.8	285.2	279.1	304.8	293.9	297.8	247.5	313.0	298.9	290.1
Kentucky	58.4	52.7	47.2	57.2	53.7	50.8	47.7	58.6	52.8	53.4	59.2	55.4	53.9
Louisiana	1,591.7	1,620.5	1,600.3	1,561.5	1,560.3	1,648.7	1,634.1	1,620.4	1,343.5	1,658.2	1,806.0	1,824.7	1,622.9
Michigan	40.3	42.5	44.6	39.0	39.6	36.9	41.7	42.7	39.7	41.4	39.9	44.3	41.1
Mississippi	146.8	161.7	172.4	128.9	158.4	145.7	149.8	169.8	141.9	159.1	163.6	154.4	154.4
Montana	79.2	80.7	94.5	66.6	82.9	96.2	87.8	97.0	98.5	95.5	97.3	94.5	89.3
Nebraska	53.8	44.1	51.4	65.2	38.8	55.9	43.5	45.9	46.3	42.6	45.0	34.8	47.2
New Mexico	313.5	335.4	315.2	330.2	301.6	343.8	315.9	328.5	313.4	343.4	330.4	312.9	323.5
New York	4.3	4.5	4.7	4.5	4.3	4.3	4.6	3.5	5.5	4.3	4.6	4.5	4.5
North Dakota	79.7	75.8	78.7	74.4	71.8	68.8	82.7	83.1	45.6	43.8	81.0	74.6	71.7
Ohio	37.8	39.1	35.3	36.2	33.2	35.6	32.8	37.3	37.1	34.9	37.4	30.4	35.6
Oklahoma	526.5	557.0	604.3	543.9	541.6	527.6	545.1	589.2	593.5	569.0	545.9	599.2	562.1
Pennsylvania	14.1	13.3	15.6	13.6	11.9	15.0	14.3	13.5	16.1	15.5	11.6	18.2	14.4
Texas	2,806.1	2,784.1	2,578.2	2,600.1	2,654.6	2,761.5	2,808.9	2,773.7	2,794.4	2,787.9	2,740.2	2,958.1	2,754.1
Utah	70.3	72.3	70.4	80.8	64.8	76.1	60.5	73.6	61.3	70.3	69.7	65.9	69.6
West Virginia	11.5	12.4	13.0	9.5	9.7	11.5	10.7	9.3	9.3	9.6	9.5	10.9	10.5
Wyoming	393.4	393.8	419.6	400.1	382.9	385.2	402.3	412.2	397.8	347.8	351.8	376.7	388.6
Other States	1.0	1.6	1.6	1.5	1.6	1.6	1.5	1.2	1.4	2.6	2.4	2.0	[2]1.7
Total domestic crude	7,822.6	7,817.4	7,656.5	7,522.7	7,575.0	7,793.9	7,973.9	7,939.1	7,614.4	7,853.1	8,097.7	8,249.6	7,827.2
Foreign crude	1,151.0	1,153.8	1,242.4	1,248.7	1,248.2	1,334.0	1,373.9	1,308.3	1,417.6	1,260.4	1,128.2	1,036.7	1,242.2
Grand total 1965	8,973.6	8,971.2	8,898.9	8,771.4	8,823.2	9,127.9	9,347.8	9,247.4	9,032.0	9,113.5	9,225.9	9,286.3	9,069.4
Pennsylvania grade (included above)	34.7	35.2	36.7	31.7	31.9	35.4	32.6	32.8	33.2	33.4	31.0	38.2	33.9

[1] Arizona, 0.2; Missouri, 0.2; Nevada, 0.7; South Dakota, 0.6; Tennessee and Virginia less than 0.05.
[2] Arizona, 0.3; Missouri, 0.2; Nevada, 0.6; South Dakota, 0.6; Tennessee and Virginia less than 0.05.

Table 14.—Total demand for crude petroleum in the United States, 1964–65, by States of origin and months

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1964:													
Alabama	718	648	733	679	952	414	1,023	396	991	293	1,107	559	8,513
Alaska	853	967	703	842	1,227	867	935	898	917	816	986	854	10,865
Arkansas	2,265	2,083	2,324	2,339	2,285	2,291	2,295	2,282	2,126	2,188	2,208	2,228	26,904
California	25,681	23,461	27,296	24,007	25,513	25,372	24,433	25,820	24,655	25,566	25,305	24,505	301,614
Colorado	3,209	3,197	2,519	2,898	2,276	3,215	2,923	3,270	2,773	2,920	2,732	2,950	34,882
Florida	22	------	------	93	------	107	------	101	5	102	103	------	533
Illinois	6,072	5,670	6,104	5,434	5,040	4,850	6,431	5,836	6,318	5,790	6,090	6,195	69,830
Indiana	999	914	922	871	1,054	900	905	909	1,024	933	854	952	11,237
Kansas	9,375	8,720	8,857	8,319	8,707	9,560	9,745	8,631	8,555	8,308	8,664	8,838	106,279
Kentucky	1,626	1,692	1,818	1,280	2,012	1,521	1,564	1,692	1,524	1,856	1,515	1,637	19,737
Louisiana	46,243	48,636	46,696	46,415	46,527	45,119	46,618	44,144	44,866	42,926	45,425	49,935	548,550
Michigan	1,592	1,285	1,218	1,353	1,051	1,370	1,365	1,262	1,375	1,265	1,292	1,240	15,618
Mississippi	4,952	4,324	5,383	4,375	4,369	4,779	4,694	4,657	4,328	5,086	4,526	5,045	56,518
Montana	2,378	2,560	2,379	2,504	2,073	2,977	2,359	2,594	2,647	2,802	2,461	2,897	30,631
Nebraska	2,092	1,643	1,889	1,187	1,427	1,707	1,491	1,127	1,671	1,499	1,786	1,975	19,494
New Mexico	9,982	9,484	10,042	9,402	8,503	9,895	9,223	10,456	9,289	9,615	9,758	10,633	116,282
New York	215	183	158	152	153	156	155	145	142	147	139	143	1,888
North Dakota	2,195	2,348	2,211	2,258	1,238	1,980	2,096	2,340	2,280	2,147	2,132	2,352	25,577
Ohio	1,044	1,010	1,083	1,702	1,464	1,384	1,282	1,411	1,324	1,438	1,239	1,309	15,690
Oklahoma	17,708	15,597	16,963	16,354	18,237	15,090	18,738	17,549	16,408	17,784	16,728	17,074	204,230
Pennsylvania	507	378	598	471	474	474	344	344	424	434	277	486	5,211
Texas	84,011	79,937	80,792	78,607	82,943	79,455	86,470	88,688	81,794	85,696	78,534	87,835	994,762
Utah	2,131	2,730	2,685	2,554	2,331	2,456	2,483	2,438	2,266	1,874	2,226	2,267	28,441
West Virginia	293	244	274	289	246	199	248	222	275	239	274	334	3,137
Wyoming	10,457	10,276	11,478	10,297	12,556	12,226	12,029	12,720	11,920	12,598	10,435	11,068	138,060
Other States	49	53	51	56	48	51	56	60	60	60	51	52	[1]647
Total domestic crude	236,669	222,990	235,176	224,738	232,706	228,415	239,905	239,992	229,957	234,382	226,842	243,358	2,795,130
Foreign crude	35,657	33,111	34,036	33,489	34,594	38,872	40,460	40,098	37,993	38,693	34,713	35,923	437,639
Grand total 1964	272,326	256,101	269,212	258,227	267,300	267,287	280,365	280,090	267,950	273,075	261,555	279,281	3,232,769
Daily average:													
Domestic crude	7,634	7,689	7,586	7,491	7,507	7,614	7,739	7,742	7,665	7,561	7,561	7,850	7,637
Domestic and foreign crude	8,785	8,831	8,684	8,608	8,623	8,910	9,044	9,035	8,932	8,809	8,718	9,009	8,833
Pennsylvania grade (included above)	1,189	933	1,137	1,044	991	937	885	807	971	939	828	1,062	11,723

Table 14.—Total demand for crude petroleum in the United States, 1964–65, by States of origin and months—Continued

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1965:													
Alabama	783	348	896	780	520	250	677	674	742	987	730	789	8,176
Alaska	1,041	778	1,126	864	747	983	991	1,003	978	733	952	850	11,046
Arkansas	2,256	2,155	1,994	2,276	2,241	2,207	2,302	2,276	2,151	2,079	2,014	2,214	26,165
California	26,355	22,888	24,648	25,039	26,278	25,018	29,187	25,982	26,678	28,421	29,152	26,674	316,320
Colorado	2,781	3,090	2,707	2,547	3,327	2,539	2,828	3,265	2,526	2,614	2,468	2,842	33,534
Florida	110	84	122	80	91	10	237	92	4	134	151	121	1,236
Illinois	6,036	4,901	4,899	4,136	5,272	5,573	5,642	5,622	5,525	5,279	5,232	5,455	63,572
Indiana	981	777	930	957	1,143	909	1,075	941	951	871	982	1,017	11,534
Kansas	9,078	7,706	9,477	8,604	8,840	8,372	9,448	9,110	8,934	7,672	9,391	9,265	105,897
Kentucky	1,809	1,476	1,464	1,715	1,664	1,523	1,480	1,817	1,588	1,654	1,775	1,716	19,676
Louisiana	49,342	45,375	49,605	46,845	48,371	49,462	50,658	50,232	40,306	51,403	54,179	56,567	592,345
Michigan	1,248	1,190	1,384	1,171	1,228	1,108	1,292	1,325	1,192	1,282	1,196	1,374	14,990
Mississippi	4,552	4,528	5,344	3,867	4,909	4,372	4,644	5,263	4,253	4,931	4,909	4,786	56,358
Montana	2,454	2,260	2,930	1,998	2,572	2,885	2,722	3,006	2,956	2,962	2,919	2,930	32,594
Nebraska	1,669	1,234	1,593	1,956	1,203	1,678	1,350	1,423	1,389	1,321	1,350	1,078	17,244
New Mexico	9,717	9,392	9,772	9,906	9,349	10,313	9,792	10,184	9,403	10,644	9,912	9,699	118,083
New York	133	127	145	136	133	130	144	108	166	133	138	139	1,632
North Dakota	2,472	2,121	2,441	2,233	2,226	2,063	2,563	2,577	1,369	1,358	2,429	2,313	26,165
Ohio	1,173	1,096	1,095	1,085	1,028	1,067	1,016	1,156	1,114	1,084	1,123	942	12,979
Oklahoma	16,321	15,596	18,732	16,320	16,790	15,828	16,898	18,266	17,804	17,640	16,377	18,578	205,150
Pennsylvania	437	373	485	407	368	450	443	418	482	480	349	564	5,256
Texas	86,991	77,955	79,921	78,003	82,293	82,845	87,075	85,986	83,833	86,424	82,205	91,701	1,005,232
Utah	2,178	2,023	2,182	2,423	2,010	2,283	1,877	2,283	1,840	2,178	2,091	2,043	25,411
West Virginia	355	346	403	285	301	346	333	287	278	299	286	340	3,859
Wyoming	12,196	11,025	13,008	12,004	11,871	11,555	12,472	12,778	11,933	10,782	10,554	11,679	141,857
Other States	32	44	49	45	49	47	46	38	43	81	72	61	[2]607
Total domestic crude	242,500	218,888	237,352	225,682	234,824	233,816	247,192	246,112	228,433	243,446	242,936	255,737	2,856,918
Foreign crude	35,682	32,306	38,514	37,460	38,694	40,021	42,590	40,558	42,529	39,071	33,842	32,137	453,404
Grand total 1965	278,182	251,194	275,866	263,142	273,518	273,837	289,782	286,670	270,962	282,517	276,778	287,874	3,310,322
Daily average:													
Domestic crude	7,823	7,817	7,657	7,523	7,575	7,794	7,974	7,939	7,614	7,853	8,098	8,250	7,827
Domestic and foreign crude	8,974	8,971	8,899	8,771	8,823	9,128	9,348	9,247	9,032	9,114	9,226	9,286	9,069
Pennsylvania grade (included above)	1,076	986	1,138	951	988	1,061	1,011	1,017	997	1,035	930	1,185	12,375

[1] Arizona, 64; Missouri, 65; Nevada, 255; South Dakota, 247; Tennessee, 10 and Virginia, 6.
[2] Arizona, 95; Missouri, 73; Nevada, 205; South Dakota, 219; Tennessee, 11 and Virginia, 4.

stills, a small quantity used as refinery fuel, and crude stocks at refineries. Classification of receipts, by State of origin, shows receipts from local production (intrastate), receipts from other States (interstate), and receipts of imported crude.

Classification by method of transportation indicated the final receipts by water, pipelines, and tank car and truck. Receipts of domestic crude by water usually are moved by pipeline from the point of production to the point of water shipment.

Receipts of domestic and foreign crude petroleum at refineries totaled 3,296.8 million barrels in 1965; foreign crude receipts of 451.8 million barrels represented 13.7 percent of this total. The refineries processed 3,300.8 million barrels and reported 0.5 million used for refinery fuel and losses; the difference, 4.5 million barrels, was withdrawn from stocks.

The major waterborne shipments were from the gulf coast to the east coast and between States in the gulf-coast districts. There are also interstate and intrastate shipments by water on the west coast and Mississippi River.

All foreign crude receipts into the east coast district are received by water. A few refineries operating in western New York and refineries in district II, which comprises the Great Lakes and mid-continent areas, receive their foreign crude by pipeline from Canada. Very little foreign crude is processed at refineries in the Rocky Mountain States; such crude as is used, arrives at the refineries by pipeline and rail from Canada. West coast refiners received 64.8 percent of their foreign crude supply by water, the rest was received by pipeline at refineries near the Canadian border.

Although crude oil and petroleum product imports are substantial, domestically produced crude oil accounts for 86.3 percent of the crude oil processed at domestic refineries.

PIPELINES

Domestically produced crude oil moves through gathering pipelines then into trunk pipelines which transport it either to the refining centers or tanker and barge loading facilities.

Pipelines are found at both ends of the spectrum. At one end are the gathering and trunk lines moving crude oil either to refineries for processing or for transport of crude oil for shipment by water. At the other end product pipelines transport the finished products from refineries or marine terminals to the marketing areas for distribution to the ultimate consumer.

Pipeline transportation of crude and petroleum products has come a long way over the past 100 years. The first successful crude pipeline, 5 miles long, was built in Pennsylvania by Samuel Van Syckel in 1865. By 1965 there were more than 210,000 miles of pipeline in all types of service. From some 9,000 miles in place in 1941, the mileage of product pipelines had increased nearly sevenfold by the end of

Table 15.—Receipts of domestic and foreign crude petroleum at refineries in the United States
(Million barrels)

Method of transportation	1961	1962	1963	1964	p 1965
By water:					
Intrastate	136.0	140.9	129.8	125.9	147.3
Interstate	268.3	277.6	307.1	285.9	296.6
Foreign	317.1	330.2	322.2	337.1	344.4
Total by water	721.4	748.7	759.1	748.9	788.3
By pipeline:					
Intrastate	1,286.1	1,333.4	1,377.2	1,426.0	1,407.0
Interstate	871.9	865.8	900.8	929.4	955.8
Foreign	64.1	79.7	90.1	101.7	107.4
Total by pipeline	2,222.1	2,278.9	2,368.1	2,457.1	2,470.2
By tank cars and trucks:					
Intrastate	34.9	36.9	36.2	34.4	34.8
Interstate	8.1	6.2	4.5	4.3	3.5
Foreign	0.5	0.1	0.1	-----	-----
Total by tank cars and trucks	43.5	43.2	40.8	38.7	38.3
Grand total	2,987.0	3,070.8	3,168.0	3,244.7	3,296.8

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Table 16.—Refinery receipts of domestic crude oil by States and districts: 1965

Receiving State and district	Total domestic receipts	Intrastate receipts	Interstate receipts from— Ala. and Miss.	Ark.	Calif., Nev. and Alaska	Colo.	N.Y. and Fla.	Ill.	Ind. and Mich	Kans.	Ohio and Ky.	La.	Mont.	Nebr., N. Dak., and S. Dak.	New Mex.	Okla.	Texas	Utah	W. Va.	Wyo.	Total receipts
Delaware, Massachusetts, Rhode Island	4,799											4,799									4,799
Florida, Georgia, Virginia	2,175		1,447														728				2,175
Maryland																					
New Jersey	41,938		10,997				738					21,978					8,225				41,938
New York	12,408							3,166			523		203			7,442	874			200	12,408
Pennsylvania:																					
East	98,388		4,210				508					38,574					55,096				98,388
West	15,968	5,636				31	1,588	59			1,544		3,662	273		826	4		2,345		10,332
West Virginia	2,281	1,428									853										853
Total district 1	177,957	7,064	16,654			31	2,834	3,225			2,920	65,351	3,865	273		8,268	64,927		2,345	200	170,893
Illinois	222,360	25,969				3,300			742	7,979		281	694	1,259	33,901	38,601	97,690	771		11,173	196,391
Indiana	159,242	824				2,251		8,183	21	18,582	23		12,271	5,049	9,542	32,216	35,597			34,683	158,418
Kansas	113,072	73,459				1,492								1,018	6,721	15,592	14,790				39,613
Kentucky, Tennessee	44,361	16,211	2,337				[1] 12	678	5,885		[2] 12	19,156								70	28,150
Michigan	46,943	14,759						4,570				122					15,507			11,985	32,184
Minnesota, Wisconsin	10,118													9,726						392	10,118
Missouri, Nebraska	24,012	91				45				65				1,035	5,798	5,837	3,624			7,517	23,921
North Dakota	16,421	16,276											145								145
Ohio:																					
East	36,841	9,997	17	6		1,804		20,752				40	609							4,570	27,798
West	111,260		3,252	1,061		5,208		6,253	434	210		25,510	750	4,168	1,624	8,438	50,889			2,509	110,306
Oklahoma	139,960	102,977				30				7,747		303		13	2,362		24,663	1,865			36,983
Total district 2	924,590	260,563	5,606	1,067		14,130	12	40,436	7,082	34,583	35	45,412	14,469	22,268	59,948	100,684	242,760	2,636		72,899	664,027
Alabama	3,949	752	2,864									333									3,197
Arkansas	28,780	26,301										2,479									2,479
Louisiana	293,750	232,427	21,481	131			75									30	39,606				61,323
Mississippi	51,677	9,262										42,415									42,415
New Mexico	11,551	11,522			[3] 5												24				29
Texas	889,004	659,968	876									186,078			39,595	365		2,122			229,036
Total district 3	1,278,711	940,232	25,221	131	5		75					231,305			39,595	395	39,630	2,122			338,479
Colorado	12,896	2,674											709					116		9,397	10,222
Montana	28,571	11,428																		17,143	17,143
Utah	33,050	8,027			148	16,435							3		98					8,339	25,023
Wyoming	41,178	39,591				1,568								19							1,587
Total district 4	115,695	61,720			148	18,003							712	19	98			116		34,879	53,975

California	337,750	312,758	------	-----	[4] 4,332	------	-----	------	-----	------	-----	-------	------	------	6,777	-------	-------	13,883	-----	-------	24,992
Other States [5]	10,361	6,824	------	-----	3,537	------	-----	------	-----	------	-----	-------	------	------	-------	-------	-------	------	-----	-------	3,537
Total district 5	348,111	319,582	------	-----	7,869	------	-----	------	-----	------	-----	-------	------	------	6,777	-------	-------	13,883	-----	-------	28,529
United States, total	2,845,064	1,589,161	47,481	1,198	8,022	32,164	2,921	43,661	7,082	34,583	2,955	342,068	19,046	22,560	106,418	109,347	347,317	18,757	2,345	107,978	1,255,903
Daily average	7,795	4,354	130	3	22	88	8	120	19	95	8	937	53	61	292	299	952	51	7	296	3,441

[1] Oil from Virginia.
[2] Oil from Tennessee.
[3] Oil from Arizona.
[4] Includes 56,000 barrels from Arizona.
[5] Alaska, Hawaii, Oregon, and Washington.

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Table 17.—Crude runs to stills and refinery receipts of crude oil by origin of the crude and method of transportation: 1965

(Thousand barrels)

State and District	Crude runs to stills	Refinery fuel use and losses	Refinery receipts of domestic crude—								Refinery receipts of foreign crude	
			By State of origin of domestic crude	Change in refinery stocks	By receiving State and method of transportation							
					Intrastate			Interstate				
					Pipelines	Tank cars and trucks	Tankers and barges	Pipelines	Tank cars and trucks	Tankers and barges	Pipelines	Tankers and barges
Delaware, Massachusetts, Rhode Island	37,293	31	-------	—387	-------	-----	------	------	----	4,799	------	32,138
Florida, Georgia, Virginia	15,320	---	1,333	+219	-------	-----	------	------	479	1,696	------	13,364
Maryland	4,202	—20	-------	—32	-------	-----	------	------	----	------	------	4,150
New Jersey	158,938	---	-------	—373	-------	-----	------	------	----	41,938	------	116,627
New York	27,600	---	1,588	—331	-------	-----	------	12,408	----	------	9,682	5,179
Pennsylvania: East	176,253	89	-------	—625	-------	-----	------	------	----	98,388	------	77,329
West	16,103	—6	5,636	—129	5,567	69	------	9,020	424	888	------	------
West Virginia	2,272	---	3,773	+9	1,373	55	------	514	339	------	------	------
Total district I	[1] 437,981	94	12,330	—1,649	6,940	124	------	21,942	1,242	147,709	9,682	248,787
Illinois	222,553	9	69,630	—202	25,869	100	------	196,391	----	------	------	------
Indiana	159,242	10	7,451	+23	810	514	------	158,374	44	------	88	------
Kansas	113,004	80	108,042	+88	71,898	2,066	------	89,574	89	------	------	------
Kentucky, Tennessee	44,103	—8	16,228	+261	5,655	214	10,342	189	24	27,987	------	------
Michigan	52,192	51	15,214	—71	13,288	1,526	------	82,184	----	------	5,229	------
Minnesota, Wisconsin	39,508	24	-------	—96	-------	-----	------	10,118	----	------	29,818	------
Missouri, Nebraska	28,989	---	12,906	+78	-------	91	------	28,921	----	------	------	------
North Dakota	16,828	—11	[2] 26,021	+104	15,726	550	------	------	145	------	------	------
Ohio: East	36,896	---	12,940	—55	8,510	583	------	27,798	----	------	------	------
West	117,718	5		—163	987	17	------	110,806	----	------	6,300	------
Oklahoma	189,965	8	212,824	—8	100,195	2,782	------	86,988	----	------	------	------
Total district II	965,448	118	480,751	—96	241,828	8,393	10,342	685,788	252	27,987	40,880	------
Alabama	4,091	—9	8,482	—121	-------	-----	752	------	237	2,960	------	12
Arkansas	28,835	—5	27,499	—50	25,204	1,097	------	2,407	72	------	------	------
Louisiana	293,597	—11	574,495	+164	168,946	3,092	60,389	57,685	183	3,455	------	------
Mississippi	51,980	---	49,013	—303	6,924	2,338	------	41,488	----	927	------	------
New Mexico	11,559	15	117,940	—23	10,434	1,088	------	------	29	------	------	------
Texas	889,679	118	1,007,285	—793	609,197	8,139	42,632	123,257	----	105,779	------	------
Total district III	1,279,741	108	1,784,714	—1,126	820,705	15,754	103,773	224,837	521	113,121	------	12
Colorado	12,775	55	34,838	+66	315	2,359	------	10,106	116	------	------	------
Montana	33,091	5	30,474	+46	10,766	662	------	17,143	----	------	4,571	------
Utah	33,176	14	26,784	—140	7,658	369	------	24,243	780	------	------	------

Wyoming	41,509	22	147,569	—129	38,498	1,093	------	1,091	496	------	224	------
Total district IV	120,551	96	239,665	—157	57,237	4,483	------	52,583	1,392	------	4,795	------
California	413,002	48	316,295	—1,416	273,512	6,052	33,194	20,681	71	4,240	------	73,879
Other States [3]	84,119	49	11,309	—78	6,824	-----	------	------	----	3,537	52,009	21,720
Total district V	497,121	92	327,604	—1,494	280,336	6,052	33,194	20,681	71	7,777	52,009	95,599
United States, total	3,300,842	508	2,845,064	—4,522	1,407,046	34,806	404	2,618	10	813	294	944
Daily average	9,043	1	7,795	—12	3,855	95	147,309	955,831	3,478	296,594	[4] 107,366	344,398

[1] Includes 267,898,000 barrels in Delaware River Valley
[2] Includes 19,000 barrels from South Dakota.
[3] Alaska, Arizona, Hawaii, Nevada, Oregon, and Washington.
[4] Excludes crude oil imported for direct fuel use by pipelines.

1965. Also, there has been a significant increase in the mileage of gathering lines; from 53,000 miles in 1941, mileage of gathering lines had expanded to 77,000 miles by 1965. A long-term historical series for gathering lines, as well as crude and product trunklines, is shown in table 18.

Pipeline tariff rates for crude oil shipped into the Illinois-Indiana refining area were reduced approximately 2 cents per barrel during 1965. Product pipeline rates were unchanged for the year. Table 22 shows representative pipeline tariffs for both crude oil and refined products.

REFINED PRODUCTS

Products of about 4.5 million barrels per day were needed to meet the demand in district I during 1965. Nearly 6 out of every 10 barrels of products needed in district I were supplied from district III by water transport and from imports.

Over the past 2 years, completion and operation of the Colonial Pipeline from the Houston area to the New York Harbor area and, more recently, the extension of the Plantation Pipeline from Greensboro, North Carolina, northward to Northern Virginia near Washington, D.C., is having a decided impact on the shipment of some petroleum products from the gulf coast to the east coast by tanker. Shipments of gasoline by water, for example, dropped 37 million barrels in 1965 and at the same time, pipeline shipments of gasoline increased 65 million barrels or 57 percent. During 1965, shipments of gasoline to the east coast or district I by the pipelines al-

Table 18.—Mileage of petroleum pipelines in the United States

(Miles)

Year	Trunklines		Gathering	
	Crude	Products	lines	Total
1926	44,470	(1)	45,700	90,170
1931	58,020	(1)	53,640	111,660
1936	57,820	(1)	52,760	110,580
1941	65,180	9,001	53,170	127,351
1950	71,373	20,881	60,560	152,814
1953	75,228	27,236	68,040	170,504
1956	78,594	36,420	73,526	188,540
1959	70,317	44,483	75,182	189,982
1962	70,355	53,200	76,988	200,543
1965	72,383	61,443	77,041	210,867

[1] Included in crude lines.

Table 19.—Mileage and sizes of petroleum pipelines in the United States, January 1, 1962, and January 1, 1965

(Miles)

Size (inches)	Trunklines				Gathering lines		Total	
	Crude		Products					
	January 1, 1962	January 1, 1965	January 1, 1962	January 1, 1965	January 1, 1962	January 1, 1965	January 1, 1962	January 1, 1965
2	-----	-----	-----	-----	15,783	15,442	15,783	15,442
[1] 3	682	448	599	665	12,810	12,489	14,091	13,602
4	2,329	2,475	2,398	2,670	30,146	30,111	34,873	35,256
[2] 6	9,749	9,915	13,224	14,510	12,147	12,795	35,120	37,220
[3] 8	20,265	20,558	19,503	22,636	4,768	4,707	44,536	47,901
10	11,803	12,372	7,031	7,533	770	788	19,604	20,693
12	8,980	9,128	6,105	6,803	513	631	15,598	16,562
14	487	483	1,313	1,781	17	27	1,817	2,291
16	4,221	4,842	1,012	1,147	22	31	5,255	6,020
18	1,982	1,949	873	975	1	1	2,856	2,925
20	4,362	4,549	1,010	1,036	11	15	5,383	5,600
22	2,658	2,658	-----	9	-----	-----	2,658	2,667
24	1,366	1,364	132	137	-----	3	1,498	1,504
26	829	829	-----	-----	-----	1	829	830
28	-----	-----	-----	-----	-----	-----	-----	-----
30	642	646	-----	194	-----	-----	642	840
32	-----	-----	-----	288	-----	-----	-----	288
34	-----	163	-----	-----	-----	-----	-----	163
36	-----	4	-----	1,059	-----	-----	-----	1,063
Total	70,355	72,383	53,200	61,443	76,988	77,041	200,543	210,867

[1] Includes a small amount of 2-inch pipe in trunklines.
[2] Includes a small amount of 5-inch pipe in trunklines.
[3] Includes a small amount of 7-inch pipe in trunklines.

Table 20.—Transportation of petroleum products by pipeline, in the United States, by months

Item	1965 January	February	March	April	May	June	July	August	September	October	November	December	Total	1964 total
Turned into lines:														
Gasoline, total	78,082	72,195	77,682	79,252	87,459	89,225	89,662	88,113	85,414	87,057	85,721	86,978	1,006,840	924,898
Motor	77,027	71,210	76,560	78,137	86,393	88,062	88,530	86,959	84,331	85,877	84,606	86,031	993,723	NA
Aviation	1,055	985	1,122	1,115	1,066	1,163	1,132	1,154	1,083	1,180	1,115	947	13,117	NA
Jet fuel, total	6,074	5,532	7,877	6,416	6,707	6,195	7,188	6,684	6,895	6,703	7,297	6,892	80,460	31,427
Naphtha type	2,355	2,482	2,682	2,278	2,486	2,222	2,202	2,236	2,383	2,160	2,208	2,279	27,973	NA
Kerosine type	3,719	3,050	5,195	4,138	4,221	3,973	4,986	4,448	4,512	4,543	5,089	4,613	52,487	NA
Kerosine	7,104	5,887	2,828	3,719	3,908	3,544	3,775	4,289	4,615	5,161	5,668	6,703	57,201	100,617
Distillate fuel oil	38,607	31,271	30,041	24,478	24,544	26,261	27,946	30,461	31,348	33,023	38,171	47,501	383,652	318,731
Natural gas liquids	13,804	13,297	12,423	10,833	10,543	10,750	11,263	11,679	12,047	13,861	14,576	17,607	152,683	132,333
Delivered from lines:														
Gasoline, total	76,559	69,134	76,674	79,939	86,804	89,674	91,528	88,605	85,674	88,446	86,344	89,026	1,008,407	924,637
Motor	75,610	68,124	75,599	78,898	85,627	88,608	90,311	87,581	84,630	87,229	85,300	88,041	995,558	NA
Aviation	949	1,010	1,075	1,041	1,177	1,066	1,217	1,024	1,044	1,217	1,044	985	12,849	NA
Jet fuel, total	5,920	5,298	7,572	6,241	6,581	6,351	6,870	6,815	7,009	6,664	7,043	7,319	79,683	31,148
Naphtha type	2,450	2,206	2,674	2,271	2,428	2,329	2,239	2,277	2,179	2,254	2,170	2,324	27,801	NA
Kerosine type	3,470	3,092	4,898	3,970	4,153	4,022	4,631	4,538	4,830	4,410	4,873	4,995	51,882	NA
Kerosine	7,382	6,232	3,431	3,714	3,654	3,118	3,693	3,957	4,470	4,867	5,314	6,604	56,436	98,172
Distillate fuel oil	41,121	35,718	33,510	25,101	23,341	23,199	25,510	28,774	30,540	31,259	38,060	46,171	382,304	314,705
Natural gas liquids	14,571	13,470	12,699	10,960	10,441	10,616	11,299	11,087	11,854	13,336	14,257	17,944	152,534	130,785
Shortage (or overage):[1]														
Gasoline, total	(133)	(105)	(127)	(56)	(70)	(60)	100	(7)	(76)	(35)	(34)	(186)	(789)	(888)
Motor	(153)	(110)	(157)	(79)	(97)	(76)	75	(25)	(100)	(64)	(53)	(198)	(1,037)	NA
Aviation	20	5	30	23	27	16	25	18	24	29	19	12	248	NA
Jet fuel, total	48	62	83	64	70	47	67	83	66	51	72	65	778	81
Naphtha type	(2)	9	10	4	(1)	5	7	2	5	(1)	14	4	56	NA
Kerosine type	50	53	73	60	71	42	60	81	61	52	58	61	722	NA
Kerosine	130	160	136	117	106	127	88	123	135	156	120	141	1,539	1,978
Distillate fuel oil	10	(67)	(20)	(20)	(38)	8	12	(19)	(37)	(26)	(9)	83	(123)	(139)
Natural gas liquids	69	25	23	16	25	10	50	14	23	45	71	105	476	810
Stocks in lines and working tanks at end of month:														
Gasoline, total	34,233	37,399	38,534	37,903	38,628	38,239	36,273	35,788	35,604	34,250	33,661	31,799	31,799	32,577
Motor	33,732	36,928	38,046	37,364	38,227	37,757	35,901	35,304	35,105	33,817	33,176	31,364	31,364	NA
Aviation	501	471	488	539	401	482	372	484	499	433	485	435	435	NA
Jet fuel, total	1,890	2,062	2,284	2,395	2,451	2,248	2,499	2,285	2,105	2,093	2,275	1,783	1,783	720
Naphtha type	625	892	890	893	952	840	796	753	952	859	883	834	834	NA
Kerosine type	1,265	1,170	1,394	1,502	1,499	1,408	1,703	1,532	1,153	1,234	1,392	949	949	NA
Kerosine	3,522	3,017	2,278	2,166	2,314	2,613	2,607	2,816	2,826	2,964	3,198	3,156	3,156	4,994
Distillate fuel oil	21,036	16,656	13,207	12,604	13,845	16,899	19,323	21,029	21,874	23,664	23,784	25,031	25,031	23,560
Natural gas liquids	5,409	5,211	4,912	4,769	4,846	4,970	4,884	5,462	5,632	6,112	6,360	5,918	5,918	6,245

NA Not available.

[1] Figures in parentheses represent overage.

NOTE: 1964 and 1965 data for jet fuel and kerosine are not strictly comparable because of reclassification of jet fuel in 1965. For 1964, figures for kerosine type jet fuel are included with those for kerosine.

Table 21.—Transportation of petroleum products by pipelines between PAD districts in the United States, by months

(Thousand barrels)

Item	1965 January	February	March	April	May	June	July	August	September	October	November	December	Total	1964 total
From district 1 to district 2:														
Gasoline, total	2,014	1,682	1,915	2,238	2,095	2,173	2,508	2,042	2,557	2,529	2,158	2,333	26,244	23,115
Motor	2,000	1,671	1,904	2,226	2,087	2,165	2,492	2,037	2,537	2,526	2,133	2,330	26,108	NA
Aviation	14	11	11	12	8	8	16	5	20	3	25	3	136	NA
Jet fuel, total	19	11	23	-----	12	16	-----	-----	-----	8	36	12	137	-----
Naphtha type	19	11	23	-----	12	16	-----	-----	-----	8	36	12	137	-----
Kerosine	196	85	61	61	38	39	5	13	56	148	117	69	888	1,066
Distillate fuel oil	336	228	380	315	399	511	147	310	450	613	382	470	4,541	3,978
From district 2 to district 1:														
Gasoline, total	277	206	235	311	308	357	316	408	415	439	386	438	4,096	3,192
Motor	277	206	235	311	308	357	316	408	415	439	386	438	4,096	NA
Distillate fuel oil	8	15	-----	-----	-----	-----	-----	-----	14	-----	-----	11	48	-----
Natural gas liquids	308	251	179	178	160	323	200	325	297	441	393	607	3,662	2,510
From district 2 to district 3:														
Gasoline, total	1,038	977	1,057	1,082	1,124	1,123	1,214	1,379	1,304	1,358	1,265	1,224	14,145	13,842
Motor	1,003	971	1,017	1,045	1,124	1,084	1,185	1,379	1,260	1,358	1,265	1,216	13,907	NA
Aviation	35	6	40	37	-----	39	29	-----	44	-----	-----	8	238	NA
Jet fuel, total	159	119	140	95	135	184	152	50	115	60	55	149	1,413	912
Naphtha type	159	119	134	95	135	184	150	50	115	60	55	149	1,405	NA
Kerosine type	-----	-----	6	-----	-----	-----	2	-----	-----	-----	-----	-----	8	NA
Distillate fuel oil	166	212	202	268	251	218	168	207	269	336	423	374	3,094	4,380
Natural gas liquids	6	12	-----	11	-----	-----	7	6	6	9	5	6	68	-----
From district 3 to district 1:														
Gasoline, total	12,365	11,185	14,019	13,816	14,598	15,689	17,115	16,201	15,939	16,125	15,425	16,459	178,936	113,831
Motor	12,291	11,095	13,871	13,711	14,391	15,610	16,921	16,066	15,838	15,940	15,267	16,394	177,395	NA
Aviation	74	90	148	105	207	79	194	135	101	185	158	65	1,541	NA
Jet fuel, total	621	684	678	550	949	631	882	989	1,153	928	999	1,069	10,133	2,606
Naphtha type	-----	101	152	149	171	90	94	141	131	90	142	171	1,432	NA
Kerosine type	621	583	526	401	778	541	788	848	1,022	838	857	898	8,701	NA
Kerosine	2,408	1,936	1,567	1,295	1,239	1,101	1,271	1,555	1,565	1,761	2,057	2,529	20,284	20,409
Distillate fuel oil	8,110	6,692	5,941	4,361	5,169	5,152	5,776	6,908	7,709	8,052	8,737	11,808	84,415	45,716
Natural gas liquids	698	720	556	253	178	329	647	503	328	325	494	953	5,984	5,457
From district 3 to district 2:														
Gasoline, total	2,920	3,054	3,002	2,704	4,015	4,297	3,952	3,371	3,367	3,150	3,107	2,990	39,929	39,101
Motor	2,705	2,891	2,814	2,565	3,872	4,057	3,796	3,180	3,130	3,008	2,876	2,880	37,774	NA
Aviation	215	163	188	139	143	240	156	191	237	142	231	110	2,155	NA
Jet fuel, total	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	42
Kerosine type	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	42
Kerosine	174	245	58	93	110	106	50	90	85	139	125	51	1,326	1,992
Distillate fuel oil	1,456	1,013	636	589	560	454	653	513	885	1,169	765	989	9,682	10,071
Natural gas liquids	3,999	3,445	2,690	2,407	2,409	2,093	2,444	2,565	3,666	4,391	4,928	4,431	39,468	37,210
From district 3 to district 4:														
Gasoline, total	275	246	288	295	298	342	407	341	327	317	304	306	3,746	4,435
Motor	240	215	251	260	267	310	374	311	297	285	275	274	3,359	NA
Aviation	35	31	37	35	31	32	33	30	30	32	29	32	387	NA
Kerosine	197	170	191	191	189	166	175	193	193	238	235	237	2,375	2,057
Distillate fuel oil	31	28	39	39	35	37	41	35	39	36	35	32	427	498
Natural gas liquids	100	99	116	67	50	46	55	59	89	54	70	118	923	1,446

From district 3 to district 5:														
Gasoline, total	815	693	702	790	811	765	733	746	770	664	809	876	9,174	8,464
Motor	815	693	702	790	811	765	733	746	770	664	809	876	9,174	NA
Jet fuel, total	204	163	244	160	217	181	197	244	259	267	213	268	2,617	2,092
Naphtha type	204	139	244	160	217	157	142	202	216	204	177	203	2,265	NA
Kerosine type	-----	24	-----	-----	-----	24	55	42	43	63	36	65	352	NA
Kerosine	46	62	59	33	38	13	3	-----	-----	-----	-----	-----	254	435
Distillate fuel oil	138	114	209	186	220	158	166	184	178	161	102	156	1,972	1,733
From district 4 to district 2:														
Gasoline, total	199	230	230	240	303	267	426	357	329	256	259	243	3,339	3,637
Motor	199	230	230	240	303	267	426	357	329	256	259	243	3,339	NA
Kerosine	4	2	3	2	1	1	1	3	-----	2	3	1	23	30
Distillate fuel oil	166	122	161	125	110	164	107	99	135	128	119	133	1,569	1,652
From district 4 to district 5:														
Gasoline, total	630	562	719	749	752	783	759	671	685	708	644	686	8,348	7,401
Motor	613	562	719	749	752	783	759	671	685	708	644	686	8,331	NA
Aviation	17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	17	NA
Jet fuel, total	327	382	395	437	345	198	135	173	79	86	57	121	2,735	4,337
Naphtha type	327	382	395	437	345	198	135	173	79	86	57	121	2,735	NA
Distillate fuel oil	588	416	424	298	315	291	173	298	353	435	414	446	4,451	4,180

NA Not available.

NOTE: 1964 and 1965 data for jet fuel and kerosine are not strictly comparable because of reclassification of jet fuel in 1965. For 1964, figures for kerosine type jet fuel are included with those for kerosine.

Table 22.—Pipeline tariff rates for crude petroleum and petroleum products, January 1, 1965 and 1966
(Cents per barrel)

Origin	Destination	1965	1966
Crude oil:			
West Texas	Houston, Tex.	$0.16	$0.16
West Texas	East Chicago, Ind.	0.31	0.29–0.31
West Texas	Wood River, Ill.	0.27–0.28	0.27–0.28
Oklahoma	Chicago, Ill.	0.24	0.22
Oklahoma	Wood River, Ill.	0.21	0.19
Eastern Wyoming	Chicago, Ill.	0.35	0.33
Eastern Wyoming	Wood River, Ill.	0.32	0.30
Refined products:			
Houston, Tex.	Atlanta, Ga.	$0.249–0.287	$0.249–0.287
Houston, Tex.	New York, N.Y.	0.348	0.348
Baytown, Tex.	Chicago, Ill.	[1]0.36	[1]0.36
Tulsa, Okla.	Minneapolis, Minn.	0.52	0.52
Salt Lake City, Utah	Spokane, Wash.	0.55	0.55
Philadelphia, Pa.	Rochester, N.Y.	0.24	0.24

[1] Rates are adjusted seasonally as follows:
April 1–September 30: Motor fuel, $0.36; distillate fuel oil, $0.40.
October 1–March 31: Motor fuel, 0.41, distillate fuel oil, 0.45.

Source: Interstate Commerce Commission.

most equaled the 179 million barrels shipped by tanker. Another sharp increase was in the pipeline shipment of distillate. There were about 45.7 million barrels of this product group shipped by pipeline in 1964. In 1965, however, pipeline shipments increased to 84.4 million barrels, or 85 percent.

INTERCOASTAL SHIPMENTS

Most of the tankers in service between the gulf and district I are under long-term charter or are company owned. Only about 5 percent of the vessels are under spot charter, that is single voyage or two consecutive voyage charters. Table 25 shows the trend in the spot charter market for both clean and dirty cargoes and fixtures over and under the cutoff point of 25,000 deadweight tons. Although intense competition from product pipelines has made sharp inroads on tanker shipments of products such as gasoline, kerosine, and light heating oil to district I, the effect on the spot-charter rates from the U.S. gulf to destinations north of Cape Hatteras has been minor indeed. As shown in the accompanying table, the spot-tanker rate has stiffened because of a strong demand for smaller tankers by the armed services to supply Viet Nam military requirements.

RAIL, LAKE, AND RIVER SHIPMENTS

Rail transportation.—Interdistrict shipments of petroleum by rail represent only a small part of the total volume of crude oil and refined products transported. Liquefied petroleum gases and lubricants comprise the major part of these shipments. Table 26 shows the interdistrict rail distribution of crude oil and petroleum products. It is based on a 1-percent waybill sample compiled by the Interstate Commerce Commission and data compiled by the Bureau of Mines.

Rail shipments of petroleum within the PAD districts are about double the volume of interdistrict shipments. In 1963, intradistrict shipments were about 90 million barrels.

Lake and river.—The Corps of Engineers, U.S. Army, compiles data showing crude petroleum and petroleum products shipped via the Great Lakes and the Ohio River between PAD district 2 and PAD district 1. The river shipments are mostly crude oil moving from Ohio and Kentucky to refineries in western Pennsylvania and West Virginia. The lake shipments are primarily fuel oils moving to markets in Pennsylvania and New York.

Table 23.—Petroleum oils, crude and refined, shipped from gulf and west coasts to east coast ports and from the gulf coast to west coast ports

(Thousand barrels)

Item	1965													1964 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Gulf coast to east coast:														
Crude oil	12,974	11,578	11,683	8,641	8,622	8,298	11,008	10,443	8,560	9,426	11,507	12,852	125,592	133,432
Unfinished oils	1,852	612	1,398	1,037	992	594	943	481	590	707	501	171	9,878	NA
Gasoline	15,866	12,668	14,069	16,151	17,447	13,979	15,607	17,001	14,397	17,755	15,801	17,001	187,742	225,004
Kerosine	4,204	2,626	2,662	2,515	2,386	1,850	1,943	2,004	1,814	1,943	2,054	2,734	28,735	44,149
Distillate fuel oil	19,127	16,020	14,842	14,147	13,229	10,156	11,929	11,791	11,275	14,020	13,280	16,044	165,860	193,309
Residual fuel oil	2,479	1,896	2,602	3,114	2,660	2,108	2,359	2,379	2,818	2,685	3,738	3,794	32,632	32,618
Jet fuel	1,137	1,153	2,439	1,834	2,424	2,270	2,187	3,088	2,376	2,412	2,681	2,222	26,223	20,067
Lubricating oil	671	588	573	975	668	658	915	895	632	835	544	702	8,656	8,767
Wax	14	3	3	3	5	12	----	15	20	10	5	5	95	(1)
Asphalt and road oil	486	537	466	337	487	433	433	598	350	472	415	348	5,362	4,691
Liquefied gases	116	166	196	153	86	75	174	202	119	440	244	175	2,146	1,806
Petrochemical feedstocks	72	129	87	58	151	149	143	145	164	165	153	161	1,577	(1)
Other products	415	564	396	515	397	325	548	525	360	379	483	467	5,374	7,524
Total	59,413	48,540	51,416	49,480	49,554	40,907	48,189	49,567	43,475	51,249	51,406	56,676	599,872	671,367
West coast to east coast:														
Gasoline	----	----	17	----	----	172	76	76	73	62	----	----	476	19
Distillate fuel oil	159	271	----	----	----	194	----	----	8	207	105	----	944	950
Residual fuel oil	347	386	----	----	----	----	----	----	----	8	821	567	2,129	6,969
Jet fuel	16	----	----	----	----	----	----	----	----	----	----	----	16	40
Lubricating oil	75	42	71	82	19	92	49	83	84	24	87	24	732	668
Other products	4	----	9	4	--	12	----	4	12	----	4	12	61	80
Total	601	699	97	86	19	470	125	163	177	301	1,017	603	4,358	8,726
Gulf coast to west coast:														
Gasoline	335	1,078	1,025	703	196	333	135	218	88	485	1,003	179	5,778	8,001
Kerosine	----	----	----	----	----	----	----	----	22	----	----	----	22	947
Distillate fuel oil	----	----	----	4	----	----	119	110	152	63	----	----	448	82
Jet fuel	591	279	454	714	623	743	663	723	1,453	1,040	800	827	8,910	2,861
Lubricating oil	122	120	100	203	180	62	192	65	229	324	156	77	1,830	1,316
Other products	42	34	24	54	55	18	32	21	46	94	112	17	549	239
Total	1,090	1,511	1,603	1,678	1,054	1,156	1,141	1,137	1,990	2,006	2,071	1,100	17,537	13,446

NA Not available.

[1] Included with "other products."

Note: Data for kerosine and jet fuel for 1964 and 1965 are not strictly comparable since kerosine-type jet fuel was reclassified from kerosine to jet fuel in 1965.

Table 24.—Barge movements via the Mississippi river of crude oil and products from PAD district III to PAD districts I and II

(Thousand barrels)

Movements from district III to—	1965													1964 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
District I:														
Gasoline	689	903	868	954	915	1,084	1,254	941	1,631	277	859	889	11,264	9,828
Kerosine	39	18	20	1	6	----	7	8	7	29	36	24	195	536
Distillate fuel oil	83	71	118	93	92	70	90	79	98	110	99	104	1,107	1,073
Residual fuel oil	22	15	70	28	46	93	25	7	----	14	----	----	320	325
Jet fuel	----	----	----	17	----	----	----	----	----	----	----	----	17	----
Lubricating oil	185	149	122	125	92	137	163	83	180	114	146	134	1,630	1,434
Wax	4	5	----	5	----	----	6	----	5	----	19	----	44	(1)
Asphalt and road oil	----	----	----	----	----	----	----	----	----	----	----	----	----	138
Liquefied gases	----	----	----	----	----	----	----	----	----	----	----	----	----	169
Petrochemical feedstocks	----	26	9	----	46	----	12	----	8	10	20	18	149	(1)
Other products	18	25	29	8	25	55	24	33	3	20	36	----	276	412
Total	1,040	1,212	1,236	1,231	1,222	1,439	1,581	1,151	1,932	574	1,215	1,169	15,002	13,915
District II:														
Crude oil	2,059	1,714	1,745	1,450	1,630	1,589	1,506	1,982	1,871	1,970	2,195	2,156	21,867	21,012
Unfinished oils	4	----	3	6	7	4	8	7	8	4	5	----	56	NA
Gasoline	2,229	1,462	2,168	2,634	2,724	2,581	2,706	2,177	2,162	2,274	2,303	2,411	27,831	35,497
Kerosine	272	300	321	182	185	293	374	326	293	229	318	552	3,645	3,563
Distillate fuel oil	519	459	632	556	423	746	502	608	621	687	794	1,006	7,553	7,305
Residual fuel oil	550	767	729	934	838	1,055	926	778	493	540	725	1,009	9,344	6,553
Jet fuel	----	----	----	----	----	----	9	----	9	140	81	40	279	219
Lubricating oil	165	132	156	191	252	152	205	151	226	170	150	199	2,149	1,828
Asphalt and road oil	143	107	279	263	354	432	465	542	463	400	314	143	3,905	2,684
Liquefied gases	112	111	112	113	113	113	112	56	112	136	136	114	1,340	1,140
Petrochemical feedstocks	49	52	48	96	36	91	66	77	72	110	88	92	877	(1)
Other products	58	13	54	62	38	38	59	38	65	51	8	48	532	1,804
Total	6,160	5,117	6,247	6,487	6,600	7,094	6,938	6,742	6,395	6,711	7,117	7,770	79,378	81,605

NA Not available.

[1] Included with "Other."

Table 25.—Tanker rates from U.S. Gulf to destinations North of Cape Hatteras

Year	Clean products (cents per gallon)			Dirty products (dollars per barrel)		
	Gasoline	Kerosine	No. 2 fuel oil	30 gravity crude oil	No. 5 fuel oil	Bunker C fuel oil
	Vessels under 25,000 DWT [1]					
1960	0.77	0.84	0.89	0.30	0.32	0.33
1961	.89	.98	1.03	.41	.43	.46
1962	.80	.88	.93	.38	.40	.43
1963	.92	1.01	1.06	.45	.47	.50
1964	.86	.95	1.00	.43	.46	.48
1965	.83	.91	.96	.50	.53	.56
	Vessels over 25,000 DWT [1]					
1960	0.64	0.70	0.74	0.27	0.29	0.31
1961	.73	.81	.85	.36	.38	.40
1962	.77	.84	.89	.33	.35	.40
1963	.85	.93	.98	.37	.39	.41
1964	.76	.84	.88	.38	.40	.43
1965	.67	.74	.78	.40	.43	.45

[1] Deadweight ton.

Source: Platt's Oil Price Handbook.

STOCKS

Total stocks of all oils were reduced 2.9 million barrels during 1965; however, crude oil stocks decreased 9.8 million barrels below the December 31, 1964, level. For refined products, the closing stocks were considered by the industry to be at a much more favorable level than in 1964 when gasoline stocks were 10.6 million barrels higher than in 1965 and resulted in distressed gasoline prices. Stocks of residual fuel oil at the end of 1965 were 15.8 million barrels above the 1964 level and about 10.4 million barrels of this increase was in PAD district V.

STORAGE CAPACITY

The Bureau of Mines conducts semiannual surveys of petroleum refineries, bulk terminals, and underground storage facilities to ascertain the capacity assigned to the storage of gasoline, kerosine, distillate fuel oil, residual fuel oil, military jet fuel, and liquefied petroleum gases. Liquefied gases require special storage facilities, the bulk being underground caverns. Tanks for storing residual fuel oil can also be used for crude oil. Storage for the other products is interchangeable depending on demand.

PRICES

Crude oil.—Although there were no reductions in posted prices of crude oil in 1965, the average value per barrel of crude oil at the well declined 2 cents, to $2.86 per barrel. This resulted from increased production of low-gravity crudes, noticeably in California where the average value at the well declined from $2.43 to $2.38 per barrel.

There were no changes in posted prices of crude oil until December when a 10-cent-per-barrel increase was announced for crude oil produced in Kentucky, Illinois, Indiana, and Michigan.

The Bureau of Labor Statistics (BLS) collects prices on crude oil from six oil producing areas. Three of these series are for sweet crudes and three are for sour crudes; companies producing oil from these areas supply the BLS with price information. The Wholesale Price Index for crude petroleum (1957–59=100) was 96.9 at the 1965 yearend as compared with 96.7 a year earlier. A long-term historical series of the crude oil price index developed by BLS is shown in table 35. "Wholesale," as used in the description of the index, refers to sales in quantities not to prices by wholesalers, jobbers, and distributors.

Table 26.—Rail distribution of crude oil and petroleum products between PAD districts

(Thousand barrels)

PAD districts	Crude oil		Gasoline		Kerosine		Distillate fuel oil		Residual fuel oil		Lubricating oil		Liquefied petroleum gases		Total	
	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963
From district 1 to—																
district 2	12	-----	358	434	-----	-----	127	118	-----	45	1,252	999	53	79	1,802	1,675
district 3	-----	-----	125	119	-----	-----	-----	-----	-----	-----	191	217	-----	35	316	371
district 4	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	13	-----	-----	-----	13	-----
district 5	-----	-----	-----	-----	-----	-----	-----	49	-----	-----	52	61	24	-----	76	110
From district 2 to—																
district 1	29	-----	685	674	19	-----	128	139	20	35	466	526	3,752	4,765	5,099	6,139
district 3	29	89	518	648	29	-----	222	175	313	174	1,885	1,597	2,285	2,398	5,281	5,081
district 4	189	332	42	114	-----	-----	18	18	225	60	110	157	320	279	904	960
district 5	-----	-----	-----	41	-----	-----	44	36	47	-----	179	72	144	68	414	217
From district 3 to—																
district 1	727	869	829	635	-----	-----	99	24	40	18	584	743	11,606	9,825	13,885	12,114
district 2	296	181	1,245	1,126	16	64	114	147	653	760	3,106	2,518	10,005	7,959	15,435	12,755
district 4	45	137	61	21	65	-----	-----	-----	-----	22	193	290	174	72	538	542
district 5	-----	-----	979	1,248	-----	19	211	227	125	47	115	218	543	597	1,973	2,356
From district 4 to—																
district 2	556	166	240	106	-----	-----	64	51	501	568	22	-----	158	105	1,541	996
district 5	-----	-----	151	178	-----	-----	50	78	146	107	-----	-----	24	-----	371	363
From district 5 to—																
district 1	-----	-----	-----	-----	-----	-----	21	-----	-----	-----	43	-----	-----	-----	43	-----
district 2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	37	28	-----	-----	58	23
district 3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	121	50	-----	28	121	78
district 4	-----	-----	481	241	21	-----	86	213	41	44	78	169	-----	67	652	734

Source: Interstate Commerce Commission for districts I to IV; district V, Bureau of Mines.

Table 27.—Movements of crude petroleum and petroleum products on Ohio River and Great Lakes

(Thousand barrels)

PAD district 2 to PAD district 1	Crude oil		Gasoline		Kerosine		Distillate fuel oil		Residual fuel oil		Other products		Total	
	1963	1964	1963	1964	1963	1964	1963	1964	1963	1964	1963	1964	1963	1964
Via Great Lakes	623	-----	1,209	792	108	136	2,465	3,234	784	1,291	768	830	5,957	6,283
Via Ohio River	17,673	22,286	2,317	2,469	33	8	286	163	1,532	2,181	1,091	1,175	22,932	28,282

Source: Board of Engineers for Rivers and Harbors, Corps of Engineers, U.S. Army.

Table 28.—Stocks of crude petroleum, natural gas liquids, and refined products in the United States at end of year

(Thousand barrels)

	1961	1962	1963	1964	1965
Crude petroleum:					
At refineries	64,644	64,836	61,487	63,908	59,386
Pipeline and tank farm	159,105	167,390	157,544	149,415	144,740
Producers	20,915	19,785	18,330	16,734	16,163
Total crude petroleum	244,664	252,011	237,361	230,057	220,289
Natural gas liquids	37,067	31,385	33,747	35,679	35,867
Refined products	543,343	550,900	564,451	573,499	580,188
Total	825,074	834,296	835,559	839,235	836,344

Table 29.—Stocks of refined petroleum products in the United States at end of month

(Thousand barrels)

Product	January	February	March	April	May	June	July	August	September	October	November	December
1964:												
Gasoline, total	198,115	209,513	215,108	209,419	205,917	193,541	185,845	185,314	183,017	181,614	191,444	193,633
Motor	189,038	199,589	206,052	200,280	197,120	185,262	177,686	177,463	175,416	174,266	183,756	185,766
Aviation	9,077	9,924	9,056	9,139	8,797	8,279	8,159	7,851	7,601	7,348	7,688	7,867
Special naphthas	5,122	5,578	5,249	5,252	5,007	4,959	5,518	5,554	5,556	5,551	5,801	5,879
Kerosine	22,023	19,688	19,614	20,223	21,695	24,005	25,588	27,202	28,440	29,084	29,780	27,325
Distillate fuel oil	128,534	110,527	99,195	97,758	112,185	130,272	153,642	175,033	186,726	189,364	182,579	155,846
Residual fuel oil	45,352	43,262	39,100	38,477	40,459	40,356	42,977	44,644	45,364	45,936	46,185	40,403
Jet fuel [1]	17,350	17,822	18,722	17,998	18,171	17,420	18,337	19,541	18,417	17,913	17,747	18,744
Lubricants	14,291	14,330	14,399	13,318	13,838	13,142	12,885	12,889	13,006	13,043	13,323	14,062
Wax	854	871	858	859	889	911	900	881	837	835	866	908
Coke	6,421	6,564	6,646	6,794	6,893	6,963	7,086	6,894	6,696	6,619	6,878	6,795
Asphalt	15,815	18,137	21,261	22,318	21,998	20,172	17,825	15,351	12,781	11,066	11,705	14,231
Road oil	849	972	1,432	1,696	1,591	1,506	1,210	1,094	856	529	538	579
Liquefied refinery gases [2]	3,272	3,038	3,355	3,523	3,871	4,291	4,578	4,701	4,569	4,951	4,650	3,692
Petrochemical feedstocks	2,803	2,861	2,798	2,797	2,688	2,367	2,446	2,714	2,798	2,454	2,702	2,569
Miscellaneous	1,570	1,535	1,597	1,559	1,650	1,591	1,611	1,675	1,671	1,591	1,658	1,819
Unfinished oils	80,976	80,738	83,151	88,015	89,623	88,606	84,896	85,252	86,161	86,374	86,620	87,014
Total 1964	543,347	535,436	532,485	530,006	546,475	550,102	565,344	588,739	596,895	596,874	602,426	578,499
1965:												
Gasoline, total	213,925	225,043	224,911	217,353	205,611	192,563	185,087	181,790	180,270	176,608	179,247	183,058
Motor	205,734	216,576	216,063	208,331	197,102	184,318	176,901	173,338	171,527	168,229	171,203	174,717
Aviation	8,191	8,467	8,848	9,022	8,509	8,245	8,186	8,452	8,743	8,379	8,044	8,341
Special naphthas	5,888	5,794	5,719	5,535	5,444	5,263	6,162	5,793	5,743	5,835	5,999	6,209
Kerosine	24,029	20,744	18,127	18,693	20,995	23,448	25,304	25,993	26,899	27,290	26,252	24,080
Distillate fuel oil	130,619	105,282	84,571	82,754	99,394	116,559	138,535	158,377	171,973	181,988	177,278	155,407
Residual fuel oil	38,285	35,711	34,362	34,476	40,062	45,246	50,209	53,850	55,138	58,350	59,736	56,214
Naphtha-type jet fuel	7,528	7,992	8,467	8,659	8,451	8,551	8,673	8,111	7,151	7,559	7,508	8,338
Kerosine-type jet fuel	10,172	10,679	10,757	11,351	11,578	11,958	12,327	11,709	10,765	10,691	11,082	10,361
Lubricants	13,853	14,432	14,012	13,675	13,389	12,888	12,800	13,263	12,991	12,756	12,895	13,304
Wax	1,025	1,013	1,001	997	1,010	975	1,009	1,034	979	955	894	890
Coke	7,303	7,536	7,538	7,697	7,821	7,740	7,553	7,301	7,088	7,071	7,053	7,389
Asphalt	16,852	19,447	22,384	23,269	23,544	20,705	18,483	16,159	14,843	13,235	13,949	16,178
Road oil	779	1,003	1,200	1,375	1,467	1,310	1,083	830	599	566	483	584
Liquefied refinery gases [2]	3,452	3,394	3,033	3,360	4,153	4,496	4,612	4,580	4,538	4,383	4,307	3,665
Petrochemical feedstocks	2,497	2,786	2,920	3,029	3,185	3,355	3,506	3,493	3,688	3,900	4,516	4,093
Miscellaneous	1,850	1,697	1,565	1,562	1,556	1,525	1,523	1,573	1,690	1,694	1,751	1,809
Unfinished oils	84,767	81,442	84,226	88,022	89,007	91,246	90,715	87,131	86,037	89,967	90,760	88,609
Total 1965	562,824	543,995	524,793	521,807	536,667	547,828	567,581	580,987	590,392	602,848	608,710	580,188

[1] Breakdown not available.
[2] Includes liquefied refined gases used for petrochemical feedstocks.

Table 30.—Stocks of crude petroleum in the United States by State of origin, by month: 1965

(Thousand barrels)

State of Origin	January 1	January 31	February 28	March 31	April 30	May 31	June 30	July 31	August 31	September 30	October 31	November 30	December 31
Alabama	266	170	480	268	214	359	577	323	383	406	198	205	154
Alaska	404	307	378	193	241	437	370	309	253	187	397	359	486
Arizona	------	------	------	------	------	------	------	------	8	21	------	1	2
Arkansas	944	904	765	1,005	895	857	787	705	659	634	781	814	709
California	21,823	21,190	21,878	23,462	24,000	24,447	25,356	23,022	23,869	23,505	22,900	20,701	21,931
Colorado	3,167	3,334	2,902	3,137	3,404	2,972	3,198	3,184	2,709	2,856	2,990	3,203	3,144
Florida	148	116	107	67	77	96	205	93	123	259	298	315	376
Illinois	6,768	6,150	6,079	6,807	8,065	8,228	8,038	7,791	7,568	7,237	7,218	6,950	6,904
Indiana	349	282	307	379	386	350	397	280	304	281	378	299	296
Kansas	7,544	7,292	7,609	7,209	7,390	7,300	7,285	6,717	6,491	6,126	7,472	6,776	6,380
Kentucky	1,367	1,204	1,150	1,377	1,194	1,189	1,299	1,378	1,203	1,212	1,183	1,044	1,077
Louisiana	22,572	23,226	23,054	23,453	24,849	25,679	24,679	24,050	23,962	23,267	25,727	25,529	25,080
Michigan	1,012	981	917	793	848	855	952	905	800	880	836	867	750
Mississippi	2,610	2,827	2,862	2,241	2,951	2,729	2,898	2,955	2,411	2,670	2,780	2,483	2,435
Montana	3,546	3,648	3,749	3,486	4,039	4,174	3,953	4,069	3,990	3,851	3,828	3,812	3,730
Nebraska	1,683	1,610	1,805	1,775	1,294	1,571	1,304	1,383	1,388	1,353	1,417	1,410	1,655
Nevada	------	10	6	3	3	3	1	1	2	11	16	9	4
New Mexico	7,580	8,182	8,160	8,701	8,684	9,462	8,767	8,835	8,492	8,665	8,107	8,031	8,663
New York	30	30	30	30	30	30	30	30	63	30	30	30	30
North Dakota	1,895	1,775	1,770	1,704	1,838	1,975	2,131	1,935	1,730	1,986	2,204	1,940	2,080
Ohio	766	741	748	712	725	736	726	806	777	758	727	606	695
Oklahoma	16,816	17,506	17,463	16,319	17,463	18,041	18,679	17,812	16,868	16,247	15,137	15,427	15,107
Pennsylvania	1,221	1,149	1,129	1,059	1,065	1,111	1,080	1,074	1,091	1,046	987	1,040	887
South Dakota	------	------	------	------	------	------	------	------	------	------	------	------	------
Texas	94,212	92,347	91,565	96,504	101,453	102,002	101,323	98,314	96,579	93,467	92,033	92,347	89,729
Utah	2,676	2,701	2,715	2,778	2,478	2,552	2,412	2,648	2,505	2,728	2,685	2,613	2,563
West Virginia	1,004	929	850	792	786	768	720	670	681	708	704	706	675
Wyoming	16,305	16,543	16,400	17,035	18,079	17,957	17,337	15,629	14,077	12,691	12,725	12,940	12,762
Total domestic crude	216,708	215,154	214,878	221,289	232,451	235,880	234,504	224,918	218,986	213,082	213,758	210,457	208,304
Foreign crude located in districts:													
I–IV	8,723	8,859	9,401	11,602	11,767	13,014	12,278	11,366	10,689	11,057	11,223	9,170	7,780
V	4,626	6,152	5,989	6,672	7,157	6,177	6,804	5,817	6,706	6,961	6,835	7,070	4,205
Total foreign crude	13,349	15,011	15,390	18,274	18,924	19,191	19,082	17,183	17,395	18,018	18,058	16,240	11,985
Total crude stocks	230,057	230,165	230,268	239,563	251,375	255,071	253,586	242,101	236,381	231,100	231,816	226,697	220,289
Pennsylvania grade (included above)	2,488	2,328	2,230	2,126	2,151	2,127	2,063	2,063	2,069	2,085	2,028	2,056	1,875

Table 31.—Stocks of crude petroleum in the United States by location, by month: 1965

(Thousand barrels)

State	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	261	252	264	264	258	303	271	262	203	204	153	135	148
Alaska	404	307	378	193	241	437	370	309	253	187	397	359	486
Arizona	447	448	448	448	447	448	445	446	455	468	448	449	450
Arkansas	1,330	1,275	1,260	1,481	1,416	1,371	1,328	1,257	1,206	1,191	1,355	1,405	1,273
California, Nevada, Oregon, Washington	26,779	27,904	28,438	30,375	31,542	30,732	32,506	28,951	30,743	30,729	30,406	28,167	26,999
Colorado	1,291	1,427	1,360	1,414	1,447	1,446	1,412	1,398	1,305	1,305	1,356	1,397	1,355
Florida, Georgia, South Carolina, Virginia	645	741	731	1,046	603	798	915	1,089	1,192	769	1,077	836	993
Hawaii	372	225	195	579	378	636	372	702	547	923	368	598	154
Illinois	13,751	12,684	13,513	13,674	15,617	15,878	15,145	14,598	14,086	13,238	13,154	12,574	12,675
Indiana	3,535	3,664	3,692	3,623	4,231	4,258	4,244	4,034	3,757	3,333	3,752	3,495	3,389
Iowa, Missouri	6,844	6,937	6,819	6,547	7,029	7,138	7,235	6,903	6,764	6,229	6,336	6,053	6,578
Kansas	9,460	9,319	9,284	9,413	9,590	9,583	9,563	9,058	8,442	8,458	9,427	9,419	8,734
Kentucky, Tennessee	2,985	2,938	3,043	3,190	2,952	2,754	3,110	3,029	2,989	2,931	3,863	2,819	2,987
Louisiana	15,004	15,607	15,519	15,997	17,126	16,432	17,736	15,405	16,407	17,065	17,049	15,492	15,463
Maryland	199	67	280	148	283	113	220	278	265	333	335	199	167
Massachusetts, Delaware, Rhode Island	788	877	1,161	1,053	1,420	1,216	1,554	1,460	745	774	844	892	401
Michigan	1,900	1,847	1,787	1,669	1,852	2,039	1,915	1,782	1,696	1,874	1,760	1,744	1,704
Minnesota, Wisconsin	2,055	1,762	1,815	1,822	1,872	2,004	2,542	2,062	1,937	1,798	1,846	2,086	2,271
Mississippi	2,723	2,596	2,392	2,442	2,307	2,444	2,311	2,447	2,419	2,172	2,731	2,631	2,357
Montana	1,821	1,848	1,968	2,098	2,320	2,257	2,128	2,144	2,109	1,860	2,090	2,017	1,881
Nebraska	1,737	1,760	1,813	1,764	1,727	1,822	1,829	1,801	1,720	1,418	1,513	1,526	1,569
New Jersey	5,375	4,792	4,493	5,481	5,368	6,076	5,756	5,589	4,613	4,304	5,121	4,834	5,002
New Mexico	3,497	4,052	3,806	3,546	3,268	3,340	3,276	3,298	3,452	3,183	2,168	3,146	3,220
New York	890	1,045	1,045	1,064	884	1,120	1,123	566	606	976	535	368	422
North Dakota	1,366	1,310	1,352	1,283	1,411	1,441	1,378	1,364	1,292	1,521	1,683	1,464	1,538
Ohio	6,752	6,725	6,390	6,384	7,081	7,255	7,335	7,144	6,817	7,072	6,879	6,966	6,520
Oklahoma	17,645	17,469	15,701	15,961	16,713	18,206	18,718	16,531	16,086	15,942	15,544	15,523	15,750
Pennsylvania	8,961	9,440	9,416	9,855	9,600	10,046	8,132	10,054	9,403	10,144	9,155	9,601	7,695
South Dakota	------	------	------	------	------	------	------	------	------	------	------	------	------
Texas	80,764	80,636	81,517	86,149	91,379	92,874	90,860	89,322	87,271	83,502	82,979	82,671	80,555
Utah	1,368	1,078	1,132	1,194	1,063	1,000	986	1,107	981	931	971	1,065	998
West Virginia	690	603	586	595	576	562	520	534	537	516	503	580	614
Wyoming	8,418	8,530	8,670	8,811	9,374	9,042	8,351	7,177	6,083	5,750	6,018	6,186	5,941
Total	230,057	230,165	230,268	239,563	251,375	255,071	253,586	242,101	236,381	231,100	231,816	226,697	220,289

Table 32.—Stocks of crude petroleum in the United States by classification and location, by month: 1965

(Thousand barrels)

	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
At refineries:													
Alabama	197	191	191	201	211	207	166	174	125	106	92	72	76
Alaska	78	44	48	41	52	96	96	66	43	43	94	89	101
Arkansas	262	236	256	256	272	260	255	231	213	184	281	360	212
California, Oregon, Washington	14,907	16,699	16,828	17,754	18,052	16,784	18,277	15,742	16,261	17,058	16,286	15,601	13,608
Colorado	200	337	355	398	360	384	319	294	288	241	308	218	266
Florida, Georgia, South Carolina, Virginia	593	707	624	979	541	772	855	1,015	1,069	723	859	654	812
Hawaii	372	225	195	579	378	636	372	702	547	923	368	598	154
Illinois	2,792	2,687	3,235	3,229	4,106	3,615	3,447	3,320	3,366	2,882	2,804	2,741	2,590
Indiana	1,100	1,158	1,099	1,058	1,260	1,142	983	1,084	1,016	891	959	1,084	1,123
Kansas	1 432	1,577	1,502	1,520	1,730	1,522	1,434	1,408	1,439	1,270	1,611	1,536	1,470
Kentucky, Tennessee	1,008	1,093	1,148	1,410	975	880	1,126	910	955	996	936	1,020	1,269
Louisiana	4,243	4,843	5,192	5,018	4,996	5,099	5,312	5,002	5,085	5,967	5,026	4,156	4,407
Maryland	199	67	280	148	283	113	220	278	265	333	335	199	167
Massachusetts, Delaware, Rhode Island	788	877	1,161	1,053	1,420	1,216	1,554	1,460	745	774	844	892	401
Michigan	806	819	811	740	859	866	887	784	773	810	830	782	735
Minnesota, Wisconsin	1,449	1,115	1,198	1,347	1,344	1,462	1,723	1,435	1,303	1,233	1,134	1,242	1,353
Mississippi	1,012	787	699	677	624	684	698	689	682	608	991	898	709
Missouri	283	279	280	268	375	295	295	268	276	265	263	256	364
Montana	484	543	567	659	734	699	620	615	630	438	565	569	530
Nebraska	36	29	41	29	26	42	40	39	38	35	34	25	28
New Jersey	5,375	4,792	4,493	5,481	5,368	6,076	5,756	5,589	4,613	4,304	5,121	4,834	5,002
New Mexico	221	214	188	170	193	195	159	160	133	149	140	183	198
New York	584	627	540	705	540	617	645	193	165	221	205	187	253
North Dakota	238	246	246	182	221	235	193	194	153	300	358	332	342
Ohio	1,848	1,693	1,495	1,704	1,707	1,948	1,950	1,851	1,757	1,898	1,961	1,890	1,630
Oklahoma	1,592	2,002	2,185	2,211	2,107	2,168	2,117	1,730	1,753	1,623	1,818	1,899	1,584
Pennsylvania[1]	7,176	7,705	7,775	8,389	8,072	8,455	6,578	8,571	7,840	8,557	7,668	8,155	6,422
Texas	13,449	13,499	14,255	15,509	16,561	16,580	16,155	15,992	14,883	14,324	13,703	13,160	12,656
Utah	540	356	424	386	334	381	340	451	292	250	294	428	400
West Virginia	71	40	40	53	57	51	46	50	50	56	62	81	80
Wyoming	573	550	620	565	657	622	664	672	618	596	578	661	444
Total at refineries	63,908	66,037	67,971	72,719	74,415	74,102	73,282	70,969	67,376	68,058	66,528	64,802	59,386

Table 32.—Stocks of crude petroleum in the United States by classification and location, by month: 1965—Continued

(Thousand barrels)

	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Pipeline and tank-farm stocks:													
Alabama	43	42	53	44	29	61	78	58	61	79	44	49	57
Alaska	322	259	325	147	185	337	269	240	206	138	302	265	382
Arkansas	979	953	911	1,127	1,050	1,013	983	936	903	926	984	960	976
California, Arizona	11,086	10,114	10,526	11,531	12,430	12,948	13,067	12,227	13,475	12,641	11,532	11,143	12,352
Colorado	958	934	881	900	971	946	977	988	909	956	940	1,071	988
Florida	45	26	95	58	52	18	51	66	111	33	207	173	165
Illinois	10,489	9,527	9,808	10,005	11,084	11,817	11,276	10,847	10,301	9,942	9,910	9,412	9,682
Indiana	2,405	2,476	2,563	2,535	2,941	3,086	3,231	2,920	2,711	2,412	2,763	2,381	2,225
Iowa, Missouri	6,561	6,658	6,539	6,279	6,654	6,843	6,940	6,635	6,488	5,964	6,073	5,797	6,214
Kansas	7,525	7,218	7,265	7,403	7,373	7,552	7,631	7,159	6,511	6,696	7,317	7,405	6,771
Kentucky, Tennessee	1,912	1,780	1,830	1,720	1,917	1,814	1,924	2,059	1,974	1,875	1,867	1,739	1,658
Louisiana	8,430	8,556	8,141	8,791	10,054	9,226	10,283	8,265	9,164	8,898	9,816	9,203	9,005
Michigan	909	835	783	736	800	980	835	805	730	871	737	769	776
Minnesota, Wisconsin	606	647	617	475	528	542	819	627	634	565	712	844	918
Mississippi	1,378	1,431	1,325	1,415	1,344	1,396	1,280	1,417	1,412	1,223	1,373	1,374	1,316
Montana	980	925	1,025	1,055	1,238	1,191	1,155	1,163	1,129	1,078	1,181	1,088	1,023
Nebraska	1,586	1,616	1,657	1,620	1,596	1,675	1,684	1,657	1,577	1,278	1,374	1,396	1,436
New Mexico	2,132	2,715	2,495	2,265	1,998	2,041	2,039	2,018	2,199	1,930	1,908	1,834	1,885
New York	276	388	475	329	314	473	448	343	411	725	300	151	139
North Dakota	944	838	883	933	994	1,023	1,010	995	961	982	1,023	957	1,015
Ohio	4,824	4,952	4,815	4,605	5,299	5,232	5,310	5,218	4,985	5,099	4,843	5,001	4,815
Oklahoma	14,722	14,126	12,175	12,389	13,268	14,651	15,257	13,451	12,994	12,990	12,261	12,339	12,905
Pennsylvania	1,635	1,575	1,481	1,316	1,378	1,441	1,404	1,333	1,413	1,437	1,337	1,296	1,133
Texas	60,182	59,840	59,908	63,522	67,812	69,100	67,794	66,375	65,508	62,360	62,319	62,567	61,008
Utah	739	644	615	719	648	551	572	568	621	608	612	573	534
West Virginia	454	398	381	392	359	351	314	324	327	300	281	339	374
Wyoming	7,293	7,465	7,493	7,715	8,198	7,884	7,136	5,972	4,932	4,591	4,927	5,005	4,988
Total pipeline and tank-farm stocks	149,415	146,938	145,065	150,026	160,514	164,192	163,767	154,666	152,647	146,597	146,943	145,131	144,740
Lease stocks	16,734	17,190	17,232	16,818	16,446	16,777	16,537	16,466	16,358	16,445	18,345	16,764	16,163
Total stocks: 1965	230,057	230,165	230,268	239,563	251,375	255,071	253,586	242,101	236,381	231,100	231,816	226,697	220,289
1964	237,361	241,007	240,062	246,863	253,912	257,322	251,230	246,333	237,912	232,780	235,233	236,809	230,057

Table 33.—Capacity of storage tanks for finished petroleum products and capacity of underground storage facilities for liquefied gases, at refineries, gasoline plants, bulk terminals [1] and tank farms

(Thousand barrels)

Refinery district and date	Gasoline			Kerosine			Distillate fuel oil			Residual fuel oil			Jet fuel			Liquefied petroleum gases			
																Aboveground		Underground	
	At refineries	At bulk terminals	Total	At refineries	At bulk terminals	Total	At refineries	At bulk terminals	Total	At refineries	At bulk terminals	Total	At refineries	At bulk terminals	Total	At plants and terminals	At refineries	At plants, terminals and refineries	Total
1964:																			
East Coast:																			
April 1	25,629	59,794	85,423	3,812	19,541	23,353	21,796	72,899	94,695	7,379	17,084	24,463	470	399	869	[2] 329	[2] 230	[2] 2,157	[2] 2,716
October 1	22,740	58,450	81,190	3,751	19,331	23,082	25,140	74,056	99,196	7,042	17,812	24,854	465	312	777	[2] 362	[2] 216	[2] 2,466	[2] 3,044
Appalachian No. 1:																			
April 1	2,503	6,313	8,816	296	1,006	1,302	1,251	4,005	5,256	588	233	821	50	------	50	(2)	(2)	(2)	(2)
October 1	2,280	6,835	9,115	256	1,051	1,307	1,788	4,446	6,234	553	232	785	23	------	23	(2)	(2)	(2)	(2)
Appalachian No. 2:																			
April 1	1,465	5,009	6,474	251	696	947	439	2,264	2,703	398	67	465	27	169	196	(2)	(2)	(2)	(2)
October 1	1,411	4,758	6,169	251	786	1,037	596	2,560	3,156	387	67	454	27	169	196	(2)	(2)	(2)	(2)
Indiana, Illinois, Kentucky, etc.:																			
April 1	40,942	27,954	68,896	5,629	5,690	11,319	19,759	19,729	39,488	9,598	1,792	11,390	1,583	777	2,360	[3] 508	[3] 726	[3] 4,592	[3] 5,826
October 1	35,974	27,017	62,991	6,447	5,415	11,862	24,223	20,795	45,018	10,155	2,033	12,188	1,512	749	2,261	[3] 506	[3] 712	[3] 5,785	[3] 7,003
Minnesota, Wisconsin, North and South Dakota:																			
April 1	4,031	10,123	14,154	612	1,787	2,399	2,439	10,347	12,786	1,234	182	1,416	260	117	377	(4)	(4)	(4)	(4)
October 1	3,819	9,756	13,575	615	2,017	2,632	3,016	10,710	13,726	1,167	182	1,349	270	115	385	(4)	(4)	(4)	(4)
Oklahoma, Kansas, Missouri, etc.:																			
April 1	19,205	13,609	32,814	1,366	944	2,310	10,131	8,800	18,931	2,380	21	2,401	1,480	286	1,766	[4] 806	[4] 727	[4] 12,096	[4] 13,629
October 1	17,708	12,721	30,429	1,482	943	2,425	12,190	9,743	21,933	2,439	253	2,692	1,819	428	2,247	[4] 873	[4] 730	[4] 13,748	[4] 15,351
Texas Inland:																			
April 1	10,729	5,558	16,287	530	872	1,402	3,087	1,237	4,324	932	------	932	1,083	420	1,503	2,077	[5] 676	14,633	17,386
October 1	8,499	5,516	14,015	546	943	1,489	3,625	1,266	4,891	865	------	865	1,073	433	1,506	2,167	[5] 612	14,130	16,909
Texas Gulf Coast:																			
April 1	45,256	7,898	53,154	6,318	1,635	7,953	22,693	3,839	26,532	7,426	236	7,662	2,518	------	2,518	646	984	29,458	31,088
October 1	40,722	7,741	48,463	6,999	1,413	8,412	26,656	4,645	31,301	7,630	236	7,866	2,518	1	2,519	528	899	31,381	32,808
Louisiana Gulf Coast:																			
April 1	17,922	3,556	21,478	3,135	753	3,888	7,941	1,555	9,496	2,265	372	2,637	2,003	105	2,108	361	[6] 384	7,100	7,845
October 1	17,863	4,953	22,816	3,576	858	4,434	9,193	2,374	11,567	1,920	290	2,210	1,639	105	1,744	376	[6] 384	6,863	7,623

See footnotes at end of table.

Table 33.—Capacity of storage tanks for finished petroleum products and capacity of underground storage facilities for liquefied gases, at refineries, gasoline plants, bulk terminals [1] and tank farms—Continued

(Thousand barrels)

Refinery district and date	Gasoline			Kerosine			Distillate fuel oil			Residual fuel oil			Military jet fuel			Liquefied petroleum gases			
																Aboveground		Underground	
	At refineries	At bulk terminals	Total	At refineries	At bulk terminals	Total	At refineries	At bulk terminals	Total	At refineries	At bulk terminals	Total	At refineries	At bulk terminals	Total	At plants and terminals	At refineries	At plants, terminals and refineries	Total
Arkansas, Louisiana Inland, etc.:																			
April 1	2,212	8,152	10,364	464	1,049	1,513	1,128	2,274	3,402	328	------	328	224	425	649	209	(6)	4,622	4,831
October 1	2,214	8,171	10,385	462	903	1,365	1,159	2,501	3,660	401	------	401	133	265	398	238	(6)	4,663	4,901
New Mexico:																			
April 1	481	472	953	44	53	97	108	151	259	40	------	40	198	60	258	246	(5)	1,265	1,511
October 1	539	472	1,011	46	53	99	175	151	326	61	------	61	198	60	258	245	(5)	1,265	1,510
Rocky Mountain:																			
April 1	10,198	2,751	12,949	526	117	643	3,660	1,806	5,466	1,898	2	1,900	738	167	905	212	98	460	770
October 1	9,489	3,093	12,582	742	167	909	3,646	2,090	5,736	1,914	2	1,916	962	125	1,087	223	98	479	800
West Coast:																			
April 1	39,097	17,470	56,567	3,525	2,013	5,538	18,542	11,402	29,944	17,828	12,484	30,312	4,026	468	4,494	82	752	850	1,684
October 1	38,379	17,587	55,966	3,209	2,529	5,738	19,319	12,156	31,475	17,820	9,677	27,497	3,868	521	4,389	82	770	850	1,702
United States:																			
April 1	219,670	168,659	388,329	26,508	36,156	62,664	112,974	140,308	253,282	52,294	32,473	84,767	14,660	3,393	18,053	5,476	4,577	77,233	87,286
October 1	201,637	167,070	368,707	28,382	36,409	64,791	130,726	147,493	278,219	52,354	30,784	83,138	14,507	3,283	17,790	5,600	4,421	81,630	91,651
1965:																			
East Coast:																			
April 1	23,498	73,226	96,724	2,741	18,195	20,936	18,819	79,962	98,781	6,603	17,754	24,357	1,479	4,920	6,399	[2] 362	[2] 216	[2] 2,847	[2] 3,425
October 1	21,437	74,349	95,786	2,850	17,905	20,755	21,261	81,035	102,296	6,097	17,482	23,579	1,124	5,292	6,416	[2] 362	[2] 224	[2] 2,852	[2] 3,438
Appalachian No. 1:																			
April 1	2,618	6,902	9,520	215	930	1,145	1,358	4,526	5,884	539	232	771	120	136	256	(2)	(2)	(2)	(2)
October 1	2,432	6,936	9,368	239	935	1,174	1,796	4,656	6,452	489	232	721	143	131	274	(2)	(2)	(2)	(2)
Appalachian No. 2:																			
April 1	1,583	4,878	6,461	166	714	880	439	2,572	3,011	310	12	322	58	317	375	(3)	(3)	(3)	(3)
October 1	1,399	4,984	6,383	202	752	954	596	2,742	3,338	350	67	417	77	252	329	(3)	(3)	(3)	(3)
Indiana, Illinois, Kentucky, etc.:																			
April 1	41,921	28,896	70,817	4,654	4,205	8,859	18,938	20,071	39,009	8,781	1,944	10,725	2,567	1,935	4,502	[3] 505	[3] 712	[3] 5,733	[3] 6,950
October 1	36,442	27,621	64,063	5,711	4,165	9,876	23,166	21,283	44,449	9,830	1,957	11,787	2,455	2,264	4,719	[3] 514	[3] 674	[3] 5,671	[3] 6,859
Minnesota, Wisconsin, North and South Dakota:																			
April 1	4,518	9,782	14,300	524	1,534	2,058	2,560	10,457	13,017	1,143	182	1,325	312	493	805	(4)	(4)	(4)	(4)
October 1	4,086	9,840	13,926	678	1,523	2,201	2,669	10,733	13,402	1,608	182	1,790	322	555	877	(4)	(4)	(4)	(4)

Oklahoma, Kansas, Missouri, etc.:																				
April 1	19,626	13,658	33,284	1,277	684	1,961	11,058	9,143	20,201	2,729	12	2,741	1,940	556	2,496	[4] 838	[4] 730	[4] 15,053	[4] 16,621
October 1	18,542	13,336	31,878	1,442	714	2,156	11,508	9,855	21,363	2,285	12	2,297	1,833	754	2,587	[4] 858	[4] 816	[4] 16,847	[4] 18,521
Texas Inland:																				
April 1	9,989	5,590	15,579	328	420	748	2,904	1,226	4,130	997	------	997	1,215	891	2,106	2,245	[5] 792	13,123	16,160
October 1	9,438	5,751	15,189	327	368	695	2,935	1,352	4,287	898	------	898	1,221	900	2,121	2,287	[5] 601	12,951	15,839
Texas Gulf Coast:																				
April 1	46,054	8,265	54,319	5,399	1,168	6,567	20,370	5,354	25,724	7,683	236	7,919	4,883	104	4,987	500	899	33,752	35,151
October 1	43,766	8,117	51,883	5,127	1,352	6,479	24,060	5,177	29,237	7,794	238	8,032	4,223	284	4,507	493	935	32,904	34,332
Louisiana Gulf Coast:																				
April 1	18,444	5,033	23,477	2,474	864	3,338	7,729	2,228	9,957	2,183	177	2,360	2,804	329	3,133	377	[6] 384	6,844	7,605
October 1	18,004	5,024	23,028	2,282	868	3,150	9,854	2,188	12,042	2,640	207	2,847	2,850	317	3,167	371	[6] 360	6,825	7,556
Arkansas, Louisiana Inland, etc.:																				
April 1	2,250	8,630	10,880	460	784	1,244	1,173	2,098	3,271	353	------	353	211	475	686	244	([6])	4,684	4,928
October 1	2,260	8,549	10,809	469	779	1,248	1,151	2,371	3,522	410	------	410	207	495	702	219	([6])	4,496	4,715
New Mexico:																				
April 1	648	508	1,156	41	36	77	124	167	291	37	------	37	198	94	292	262	([5])	1,328	1,590
October 1	645	488	1,133	71	36	107	209	157	366	37	------	37	198	94	292	278	([5])	1,402	1,680
Rocky Mountain:																				
April 1	9,352	3,092	12,444	381	122	503	3,652	1,980	5,632	1,932	2	1,934	1,110	147	1,257	227	98	508	833
October 1	9,049	3,081	12,130	512	122	634	3,976	2,119	6,095	2,106	------	2,106	937	105	1,042	235	108	520	863
West Coast:																				
April 1	38,991	17,579	56,570	3,771	2,878	6,649	18,628	12,415	31,043	18,445	9,516	27,961	3,431	544	3,975	205	770	850	1,825
October 1	38,830	17,593	56,423	4,053	2,800	6,853	19,338	12,894	32,232	18,003	9,611	27,614	3,726	476	4,202	211	1,008	850	2,069
United States:																				
April 1	219,492	186,039	405,531	22,431	32,534	54,965	107,752	152,199	259,951	51,735	30,067	81,802	20,328	10,941	31,269	5,765	4,601	84,722	95,088
October 1	206,330	185,669	391,999	23,963	32,319	56,282	122,519	156,562	279,081	52,547	29,988	82,535	19,316	11,919	31,235	5,828	4,726	85,318	95,872

[1] Includes only bulk terminals operated by refinery and pipeline companies.
[2] Figures for Appalachian No. 1 included with those for east coast.
[3] Figures for Appalachian No. 2 included with those for Indiana, Illinois, etc.
[4] Figures for Minnesota, Wisconsin, etc., included with those for Oklahoma, Kansas, etc.
[5] Figures for New Mexico included with those for Texas Inland.
[6] Figures for Arkansas, Louisiana Inland, etc., included with those for Louisiana Gulf.

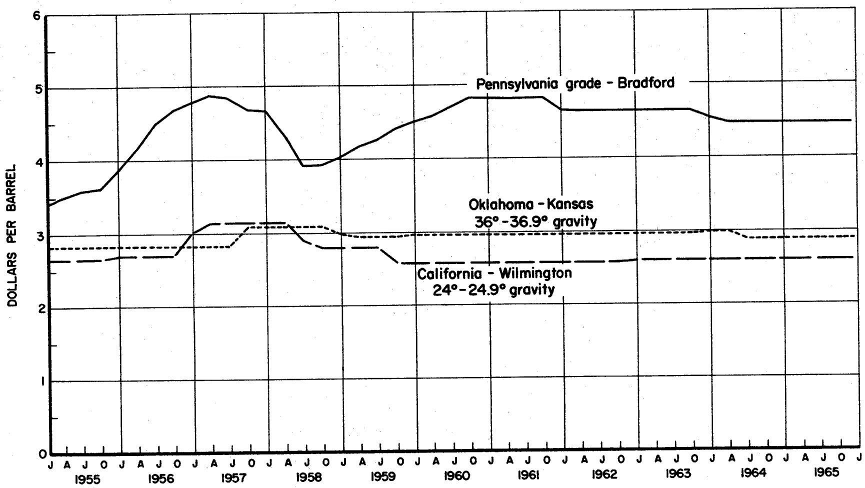

Figure 5.—Posted prices of selected grades of crude petroleum in the United States, 1955–65, by quarters.

Table 34.—Value of crude petroleum at wells in the United States, by States

State	1964 Total value at wells (thousand dollars)	1964 Average value per barrel	1965 Total value at wells (thousand dollars)	1965 Average value per barrel
Alabama	22,095	$2.60	21,047	$2.61
Alaska	33,627	3.04	34,073	3.06
Arkansas	71,120	2.66	68,974	2.66
California	729,022	2.43	753,099	2.38
Colorado	100,094	2.88	96,512	2.88
Illinois	205,592	2.93	186,664	2.93
Indiana	32,157	2.85	32,606	2.84
Kansas	310,256	2.92	305,820	2.92
Kentucky	56,746	2.87	55,638	2.87
Louisiana:				
Gulf Coast	1,548,052	3.12	1,677,960	3.11
Northern	161,570	3.01	163,754	2.96
Total Louisiana	1,709,622	3.11	1,841,714	3.10
Michigan	43,839	2.81	41,091	2.79
Mississippi	151,595	2.67	148,437	2.64
Montana	74,621	2.43	79,624	2.43
Nebraska	51,605	2.70	45,796	2.66
New Mexico:				
Southeastern	300,181	2.89	302,319	2.81
Northwestern	26,384	2.64	32,658	2.82
Total New Mexico	326,565	2.87	334,977	2.81
New York	8,321	4.44	7,246	4.44
North Dakota	63,813	2.48	65,875	2.50
Ohio	46,420	2.93	37,940	2.94
Oklahoma	587,320	2.90	587,944	2.89
Pennsylvania	22,088	4.32	21,263	4.32
South Dakota	495	2.00	438	2.00
Texas:[1]				
Gulf Coast	613,328	3.20	600,806	3.20
East Texas Field	131,717	3.03	123,132	3.04
West Texas	1,272,496	2.86	1,317,522	2.86
Other districts	911,453	2.94	920,659	2.95
Total Texas	2,928,994	2.96	2,962,119	2.96
Utah	74,867	2.62	66,045	2.61
West Virginia	12,975	3.85	13,591	3.85
Wyoming	351,043	2.53	345,785	2.50
Other States[2]	2,186	2.14	3,980	2.14
Total United States	8,017,078	2.88	8,158,298	2.86

[1] Texas Railroad Commission divisions.
[2] Arizona, Florida, Missouri, Nevada, Tennessee, and Virginia.

Refined Products.—Wholesale prices of the principal petroleum products recovered some of the losses of the past years, but only gasoline reached the wholesale price level of 1962. While posted prices for kerosine and distillate fuel oil at refineries were lower, prices away from the refinery increased. At New York Harbor, the posted price for No. 5 residual fuel oil, sold in cargo lots, was reduced from $2.84 per barrel in 1964 to $2.76 per barrel; Bunker "C" price dropped from $2.30 to $2.26. On December 22, the Secretary of the Interior announced a program of liberalized controls for residual fuel oil imports. Shortly thereafter, the Venezuelan Government announced that residual fuel oil shipments from that country would be taxed on the posted price of residual less 10 percent (later this was changed to 15 percent). Residual fuel oil of Venezuelan origin represents a major share of the imported fuel oil required to supply the east coast market. The Venezuelan Government's decision dampened the hopes of residual fuel oil consumers for a substantial cut in fuel costs as a result of the relaxed import controls.

Gasoline prices to the consumer increased from an average of 30.35 cents per gallon for regular grade in 1964 to 31.15 cents per gallon in 1965. The average service station price of gasoline (excluding taxes) increased from 19.98 cents per gallon in 1964 to 20.70 cents in 1965. Federal tax remained at 4.00 cents per gallon in 1965, but State and local taxes increased from an average of 6.33 cents per gallon to 6.45 cents per gallon.

Table 35.—Wholesale price index, crude petroleum
(1957–59 = 100)

Year	Average	January	February	March	April	May	June	July	August	September	October	November	December
1947	61.7	52.5	52.5	57.8	60.5	60.6	60.6	61.8	61.8	62.0	64.8	67.1	78.6
1948	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	83.1	82.9
1949	82.0	82.7	82.5	82.5	82.3	82.1	82.0	81.7	81.7	81.7	81.7	81.7	81.8
1950	82.0	81.8	81.8	81.8	81.8	81.9	81.9	82.0	82.0	82.0	82.1	82.1	82.3
1951	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4
1952	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4	82.4
1953	88.4	82.4	84.5	84.5	84.5	84.5	91.6	91.6	91.6	91.6	91.4	91.4	91.4
1954	91.0	91.2	91.2	91.2	91.2	91.2	90.8	90.8	90.8	90.8	90.8	90.8	91.0
1955	91.1	91.0	91.0	91.0	91.0	91.0	91.0	91.1	91.1	91.1	91.1	91.2	91.3
1956	91.6	91.3	91.3	91.3	91.4	91.4	91.6	91.6	91.6	91.6	91.6	91.6	92.4
1957	101.0	95.1	101.6	101.6	101.6	101.6	101.6	101.6	101.5	101.5	101.5	101.5	101.5
1958	101.2	101.5	101.5	101.5	101.5	101.4	101.4	100.9	100.9	100.9	100.9	100.9	100.9
1959	97.8	99.1	97.9	97.9	98.0	98.0	98.0	98.0	98.0	97.2	97.2	97.2	97.2
1960	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2	97.2
1961	97.5	97.2	97.2	97.2	97.5	97.5	97.5	97.5	97.5	97.5	97.8	97.8	97.8
1962	97.7	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.7	97.7	97.7
1963	97.3	97.7	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.2	97.2	97.2
1964	96.9	97.2	97.2	97.2	97.2	97.2	96.8	96.8	96.7	96.7	96.7	96.7	96.7
1965	96.8	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.7	96.9

Source: Bureau of Labor Statistics, U.S. Department of Labor.

Table 36.—Posted price per barrel of petroleum at wells in the United States in 1965, by grade with data change

Date	Pennsylvania grade: Bradford and Allegheny districts	Pennsylvania grade: In southwest Pennsylvania	Corning grade	Western Kentucky	Indiana-Illinois	Coldwater, Mich.	Oklahoma-Kansas: 34°–34.9°	Oklahoma-Kansas: 36°–36.9°
January 1 ---	4.48	3.93	2.67	3.00	3.00	2.80	2.91	2.92
December 1 --	---	---	---	---	---	2.90	---	---
December 6 --	---	---	2.77	3.10	3.10	---	---	---

Date	Panhandle, Texas (Carson, Gray, Hutchinson, and Wheeler Counties) 35°–36.9°	West Texas 30°–30.9° (sweet)	Lea County, N. Mex. 30°–30.9°	South Texas Mirando 24°–24.9°	East Texas	Gulf Coast: Conroe Texas	Gulf Coast: Texas 30°–30.9°	Gulf Coast: Texas 20°–20.9°	Gulf Coast: Louisiana 30°–30.9°
January 1 ---	2.80	2.81	2.65	2.97	3.10	3.35	3.10	2.90	2.85

Date	Caddo-Pine Island, La. 36°–36.9°	Magnolia-Smackover, Limestone, Ark. 31°–31.9°	Elk Basin Wyo. (including Montana) 30°–30.9°	California: Coalinga 32°–32.9°	California: Kettleman Hills 37°–37.9°	California: Midway Sunset 19°–19.9°	California: Wilmington 24°–24.9°
January 1 ---	2.97	2.62	2.63	2.96	3.21	2.23	2.58

Source: Platt's Oil Price Handbook.

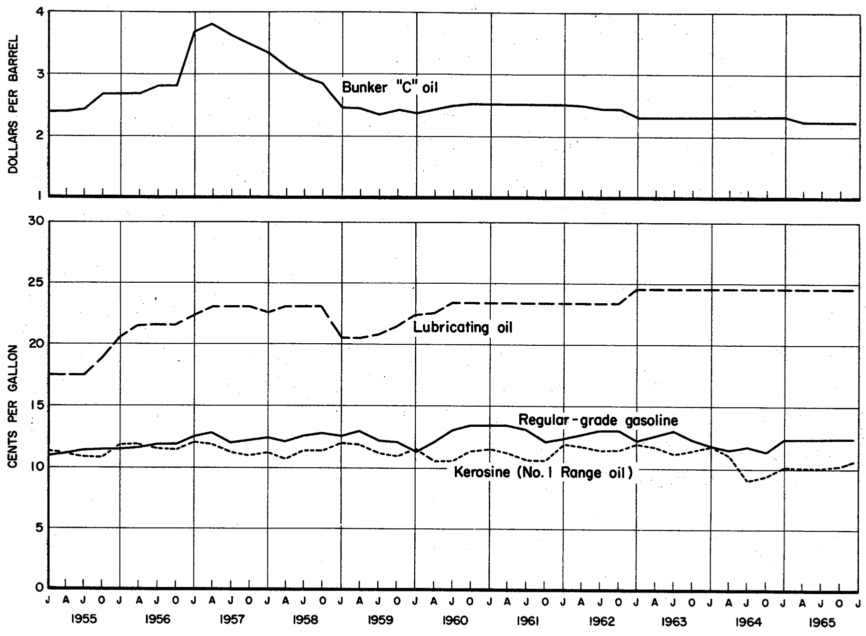

Figure 6.—Prices of Bunker "C" oil at New York Harbor, bright stock at Oklahoma refineries, No. 1 range oil at Chicago district, and regular-grade gasoline at refineries in Oklahoma, 1955–65, by quarters.

Table 37.—Average monthly price of petroleum products in the United States, 1964–65

Monthly average and grade	Year	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
Gasoline:[1]														
At refineries in Oklahoma	1964	11.63	11.63	11.51	11.41	11.63	11.63	11.63	11.63	10.83	11.31	12.04	12.25	11.59
	1965	12.25	12.25	12.25	12.25	12.25	12.25	12.25	12.08	11.95	12.25	12.25	12.25	12.21
Dealer's net (excluding tax) at 55 cities on first of month	1964	15.20	14.66	14.91	14.75	14.35	14.44	15.50	14.91	14.59	14.89	14.77	14.92	14.82
	1965	14.99	14,67	14.31	15.86	15.47	15.51	15.86	15.50	15.61	15.56	15.48	15.73	15.38
At service station (including all taxes)	1964	30.74	29.97	30.29	30.24	29.86	29.93	31.09	30.52	30.20	30.45	30.33	30.63	30.35
	1965	30.61	30.23	29.56	31.62	31.20	31.26	31.73	31.46	31.58	31.47	31.39	31.79	31.15
Kerosine:														
No. 1 range at Chicago district	1964	11.73	11.45	11.36	11.00	9.14	8.89	8.88	8.88	8.90	9.23	9.50	9.81	9.90
	1965	10.00	10.03	9.88	9.83	9.75	9.75	9.75	9.83	10.05	10.24	10.38	10.50	10.00
No. 1 fuel oil at Oklahoma	1964	10.88	10.88	10.68	10.38	10.38	10.38	10.38	10.38	10.38	10.38	10.38	10.50	10.49
	1965	10.63	10.63	10.34	10.13	10.13	10.13	10.25	10.25	10.22	10.38	10.53	10.63	10.35
Kerosine (or No. 1 fuel oil) at New York Harbor (cargo)	1964	11.14	10.99	10.75	10.00	9.85	9.80	9.80	9.80	9.80	10.00	10.19	10.55	10.22
	1965	10.65	10.65	10.55	10.20	10.20	10.20	10.20	10.34	10.46	10.80	10.80	11.12	10.51
Kerosine (or No. 1 fuel oil) at Tampa	1964	11.60	11.60	11.60	11.60	11.50	11.35	11.35	11.35	11.35	11.35	11.35	11.35	11.45
	1965	11.35	11.35	11.35	11.35	11.35	11.35	11.35	11.35	11.35	11.35	11.35	11.35	11.35
Distillate and diesel fuel oil:														
No. 2 fuel oil at refineries, Oklahoma	1964	9.88	9.88	9.68	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.50	9.49
	1965	9.63	9.63	9.34	9.13	9.13	9.13	9.13	9.13	9.22	9.38	9.53	9.63	9.33
No. 2 fuel oil at New York Harbor	1964	10.14	9.99	9.75	9.00	8.85	8.80	8.80	8.80	8.80	9.00	9.19	9.55	9.22
	1965	9.65	9.65	9.55	9.20	9.20	9.20	9.20	9.45	9.46	9.80	9.80	10.12	9.52
Diesel oil, shore plants, New York	1964	10.50	10.50	10.33	9.30	9.30	9.30	9.30	9.30	9.30	9.37	9.49	9.88	9.66
	1965	10.00	10.00	9.87	9.50	9.50	9.50	9.50	9.64	9.76	10.10	10.10	10.42	9.82
Diesel oil for ships:														
New York dollars per barrel	1964	4.29	4.29	4.23	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.91	4.12	3.99
	1965	4.16	4.16	4.09	3.91	3.91	3.91	3.91	3.91	4.02	4.15	4.15	4.28	4.05
New Orleans do	1964	4.00	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.09	4.07
	1965	4.25	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26
San Pedro do	[2] 1964	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09
Residual fuel oil:														
No. 6 fuel at refineries, Oklahoma dollars per barrel	1964	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	2.03	1.96
	1965	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.06	2.15	2.15	2.15	2.08
No. 5 fuel oil at New York harbor dollars per barrel	1964	2.89	2.89	2.87	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.83	2.78	2.84
	1965	2.78	2.78	2.77	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76
Bunker "C" for ships:														
New York dollars per barrel	1964	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
	1965	2.30	2.29	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.26
New Orleans do	[2] 1964	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19	2.19
San Pedro do	[2] 1964	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20

Table 37.—Average monthly price of petroleum products in the United States, 1964–65—Continued

Monthly average and grade	Year	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
Lubricating oil:														
Oklahoma:														
200 viscosity, No. 3 color, neutral	[2] 1964	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50
150 to 160 viscosity at 210° bright stock, 10 to 25 pour test	[2] 1964	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50
Pennsylvania:														
200 viscosity, No. 2 color, neutral 420 to 425 flash, 25 pour test	[2] 1964	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
600 steam-refined cylinder stock filterable	[2] 1964	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
South Texas: 500 viscosity, No. 2½ to 3½ color, neutral	[2] 1964	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Liquid petroleum gas (propane):														
New York Harbor	1964	7.97	8.00	7.88	7.42	7.25	7.25	7.25	7.25	7.27	7.59	7.75	8.10	7.58
	1965	8.13	8.13	8.13	8.17	7.50	7.50	7.50	7.50	7.63	7.75	7.78	8.01	7.81
Oklahoma	1964	4.02	4.34	3.80	2.95	2.50	2.63	3.00	3.00	3.20	3.42	3.55	4.00	3.37
	1965	4.00	4.00	3.97	3.69	3.63	3.63	3.70	3.94	4.28	4.50	4.58	4.93	4.07
Baton Rouge	1964	4.64	4.95	4.48	3.49	3.06	3.18	3.50	3.50	3.70	4.00	4.13	4.56	3.93
	1965	4.60	4.50	4.47	4.19	4.13	4.13	4.17	4.25	4.56	4.88	5.00	5.18	4.50
Wax: Pennsylvania 134° to 126°, white crude scale cents per pound	[2] 1964	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.13

[1] 91 octane 1964; 92 octane 1965.
[2] No change in price during 1965.

Source: Platt's Oil Price Handbook

REFINED PRODUCTS

GENERAL REVIEW

Petroleum is consumed in many finished products that must be considered individually. Competition with other fuels and economic and climatic conditions influence the consumption.

Gasoline is consumed principally in highway transport, aviation, and mechanized farming. The demand for kerosine (a product defined as meeting lamp-oil specifications for color and flashpoint) continued to climb with the expanding market for commercial jet fuel, as straight kerosine is used to fuel commercial jet aircraft. Distillate fuel oil, including light diesel oils, is used for space heating and for diesel-electric locomotive fuel and has nearly replaced residual fuel oil and coal-burning steam locomotives in railroad use. Residual fuel oil usually sells for less than crude oil at the refineries and competes directly with natural gas and coal for heavy-fuel uses. Since residual fuel oil is not normally moved by pipeline, its distribution depends on low-cost water transport and limited tank car movement. Consequently, it cannot normally compete with coal in coal-producing areas. Liquefied gases, in competition with kerosine and light distillate fuel oil for domestic use, are used as fuel in internal-combustion engines and are becoming increasingly important as the initial raw material in the development of many petrochemicals.

The total demand for all oils in 1965 averaged 11,490,000 barrels daily, including a domestic demand of 11,304,000 barrels and exports which averaged 186,000 barrels daily. On a percentage basis, total demand increased 4.3 percent; domestic demand increased 4.5 percent; and exports decreased nearly 8.0 percent.

Military purchases of all petroleum products from domestic sources in 1965 averaged 468,000 barrels daily compared with 464,000 barrels daily in 1964.

The new supply of refined products comes from crude oil fed to refineries, natural gas liquids, a small quantity of motor benzol derived from coal, and imports of refined products from foreign countries. The demand exceeded new supply in 1965, resulting in a decrease of 2,891,000 barrels in stocks of refined products.

Prior to 1963 the continuing decline in the residual fuel oil yield and the increase in the refinery shortage (excess of refinery output over input) reflect the trend in the petroleum industry to install more hydrocracking and cracking facilities to obtain higher yields of the lighter end products and minimize output of the heavier end products such as residual fuel oil.

REFINING CAPACITY

There were 289 petroleum refineries in the United States with a total installed crude oil capacity of 10,493,639 barrels per calendar day as of January 1, 1966. This represents a decrease of 11 refineries and 280,956 barrels daily in total capacity. There were no decreases in crude oil throughput capacity from 1943 through 1965. The recent dip cannot be interpreted as a downturn in the trend, however since at the beginning of 1966, 307,000 barrels a day of replacement capacity and 148,300 barrels per day of new capacity were under construction. Most of the construction was concentrated at refining centers on the Louisiana and Texas Gulf coasts; also some new and replacement capacity was under construction on the west coast. About 2.2 percent of the total operable capacity was shutdown as compared with 2.5 percent a year earlier.

Another significant factor is the growth in cracking and reforming capacity to 3,974,986 barrels per day. Capacity in this area has doubled since 1951. In addition new and replacement capacity reported under construction January 1, 1966, aggregated 343,055 barrels daily. Louisiana and the Texas Gulf refineries accounted for more than a third and California accounted for another third. All figures relating to cracking and reforming capacity are in terms of barrels per day of gasoline production. Other comparisons are available in the accompanying tables. (See tables 43 and 44.)

Table 38.—Salient statistics of the major refined petroleum products in the United States

(Thousand barrels)

	1964	p 1965
Gasoline, total:		
Production, total	1,661,301	1,704,401
At refineries	1,649,400	1,693,741
At natural gasoline plants	11,901	10,660
Stocks end of year	193,633	183,058
Imports	10,482	10,052
Exports	6,209	4,872
Domestic demand	1,657,906	1,720,156
Motor gasoline:		
Production, total	1,610,087	1,655,832
At refineries	1,598,186	1,645,172
At natural gasoline plants	11,901	10,660
Stocks end of year	185,766	174,717
Imports	10,482	10,052
Exports	683	713
Domestic demand	1,611,348	1,676,220
Aviation gasoline:		
Production	51,214	48,569
Stocks end of year	7,867	8,341
Imports	-------	-------
Exports	5,526	4,159
Domestic demand	46,558	43,936
Special naphthas:		
Production, total	26,144	28,857
At refineries	25,878	28,734
At natural gasoline plants	266	123
Stocks end of year	5,879	6,209
Imports	4,144	2,864
Exports	1,830	1,559
Domestic demand	27,551	29,832
Kerosine (including range oil):		
Production, total	94,967	94,455
At refineries	93,474	93,149
At natural gasoline plants	1,493	1,306
Stocks end of year	27,325	24,080
Imports	4	100
Exports	170	219
Domestic demand	92,738	97,581
Distillate fuel oil:		
Production, total	742,439	765,430
At refineries	742,046	765,071
At natural gasoline plants	393	359
Crude used directly as distillate	755	773
Stocks end of year	155,846	155,407
Imports	11,785	13,020
Exports	5,386	3,673
Domestic demand	750,424	775,989
Residual fuel oil:		
Production	266,825	268,567
Crude used directly as residual	3,720	3,950
Stocks end of year	40.403	56,214
Imports	295.771	344,605
Exports	18,870	14,878
Domestic demand	554,581	586,433
Jet fuel, total:		
Production	[1] 182,540	191,168
Stocks end of year	18,744	18,699
Imports	23,243	29,962
Exports	170	587
Domestic demand	204,253	220,588
Naphtha type:		
Production, total	NA	82,529
At refineries	NA	82,416
At natural gasoline plants	NA	113
Stocks end of year	NA	8,338
Imports	NA	16,493
Exports	NA	-------
Domestic demand	NA	99,052
Kerosine type:		
Production	NA	108,639
Stocks end of year	NA	10.361
Imports	NA	13,469
Exports	NA	587
Domestic demand	NA	121,536

See footnotes at end of table.

Table 38.—Salient statistics of the major refined petroleum products in the United States—Continued

(Thousand barrels)

	1964	p 1965
Lubricants:		
Production	63,668	62,925
Stocks end of year	14,062	13,304
Imports	37	29
Exports, total	18,176	16,675
Grease	397	386
Oil	17,779	16,289
Domestic demand	45,788	47,037
Wax (1 barrel = 280 pounds):		
Production	5,352	5,456
Stocks end of year	908	890
Imports	-------	11
Exports	1,734	1,649
Domestic demand	3,596	3,836
Coke (5 barrels = 1 short ton):		
Production, total	84,325	86,040
Marketable coke	34,872	36,318
Catalyst coke	49,453	49,722
Stocks end of year	6,795	7,389
Exports	13,618	11,819
Domestic demand	70,395	73,627
Asphalt (5.5 barrels = 1 short ton):		
Production	114,879	123,604
Stocks end of year	14,231	16,178
Imports (including natural)	5,912	6,302
Exports	759	392
Domestic demand	120,155	127,567
Road oil:		
Production	6,371	6,565
Stocks end of year	579	584
Domestic demand	6,545	6,560
Still gas for fuel:		
Production	131,257	135,295
Liquefied gases (including ethane) for fuel and chemical use:		
Production of LRG,[2] total	106,512	106,836
For fuel use	59,244	56,125
For chemical use	47,268	50,711
Stocks of L.R.G., total	3,692	3,665
For fuel use	3,074	2,816
For chemical use	618	849
L.P.G. for fuel and chemical use:		
Delivered from gasoline plants	189,619	200,218
Imports	4,128	7,553
Exports	5,358	7,520
Domestic demand, total	295,095	307,114
LRG [2] for fuel use	59,516	56,383
LRG [2] for chemical use	47,190	50,480
LPG [3] for fuel and chemical use	188,389	200,251
Petrochemical feedstocks:		
Production	57,578	57,851
Stocks	2,569	4,093
Imports, total	-------	500
Naphtha 400°	-------	130
Other	-------	370
Exports total	-------	1,951
Naphtha 400°	-------	-------
Other	-------	1,951
Domestic demand, total	57,599	54,876
Still gas	7,698	8,926
Naphtha 400°	24,583	23,521
Other	25,318	22,429
Miscellaneous:		
Production, total	16,777	16,907
At refineries	13,583	13,994
At natural gasoline plants	3,194	2,913
Stocks end of year	1,819	1,809
Imports	-------	-------
Exports	236	960
Domestic demand	16,353	15,957
Unfinished oils (net):		
Input (plus) output (minus)	27,322	32,111
Stocks end of year	87,014	88,609
Imports	32,587	33,706
Shortage (or overage)	79,335	80,241

p Preliminary. NA Not Available.
[1] Includes 409,000 barrels naphtha-type jet fuel produced at natural gasoline plants.
[2] Liquefied refined gases.
[3] Liquefied petroleum gases.

Table 39.—Input and output of petroleum products at refineries in the United States
(Thousand barrels)

	1961	1962	1963	1964[1]	p 1965
Input:					
Crude petroleum:					
Domestic	2,604,127	2,659,826	2,758,168	2,785,895	2,847,821
Foreign	383,031	409,805	412,484	437,434	453,021
Total crude petroleum	2,987,158	3,069,631	3,170,652	3,223,329	3,300,842
Unfinished oils rerun (net)	21,202	27,733	31,934	27,322	32,111
Total crude and unfinished oils rerun	3,008,360	3,097,364	3,202,586	3,250,651	3,332,953
Natural gas liquids	169,278	182,756	190,143	213,264	225,676
Benzol	169	91	80	29	13
Output:					
Gasoline, total	1,482,110	1,533,256	1,581,209	1,649,400	1,693,741
Motor gasoline	NA	NA	NA	1,598,186	1,645,172
Aviation gasoline				51,214	48,569
Special naphthas	32,156	37,297	22,687	25,878	[1]28,734
Kerosine[2]	141,410	156,373	164,805	93,474	93,149
Distillate fuel oil[2]	696,015	719,590	764,597	742,046	765,071
Residual fuel oil	315,577	295,679	275,910	266,825	268,567
Jet fuel, total[2]	95,210	102,269	98,745	182,131	191,055
Naphtha-type	NA	NA	NA	NA	82,416
Kerosine-type					108,639
Lubricants	59,254	61,467	63,086	63,668	62,925
Wax[3]	5,781	5,353	5,126	5,352	5,456
Coke[3]	75,333	78,724	80,688	84,325	86,040
Asphalt[3]	101,819	109,576	111,948	114,879	123,604
Road oil	5,820	7,079	6,792	6,371	6,565
Still gas for fuel	127,537	130,829	129,598	131,257	135,295
LRG,[4] total	78,947	76,826	95,357	106,512	106,836
For fuel use	NA	NA	56,394	59,244	56,125
For chemical use			38,963	47,268	50,711
Petrochemical feedstocks, total	[5]NA	[5]NA	52,393	57,578	57,851
Still gas			7,834	7,698	8,926
Naphtha 400°	NA	NA	21,984	24,657	24,511
Other			22,575	25,223	24,414
Miscellaneous products[2]	26,267	29,794	13,578	13,583	13,994
Shortage (or overage)[6]	—65,429	—63,901	—73,710	—79,335	—80,241

p Preliminary. NA Not Available.
[1] New basis, comparable with 1965 data.
[2] Production at natural gasoline plants shown as direct transfers and omitted from the input and output at the refineries.
[3] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton.
[4] Liquefied petroleum gases.
[5] Formerly included with gasoline, kerosine, distillate fuel oil, residual fuel oil, liquefied petroleum gases, miscellaneous oils and unfinished oils.
[6] Includes losses or gains in volume during processing.

Table 40.—Percentage yields of refined petroleum products from crude oil in the United States [1]

Product	1956	1957	1958	1959	1960	1961	1962	1963	1964[2]	p 1965
Finished products:										
Gasoline	43.4	43.8	45.2	44.9	45.2	44.7	44.8	44.1	44.1	44.0
Special naphthas	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	.8	.9
Kerosine	4.2	3.8	3.9	3.8	4.6	4.7	5.0	5.1	2.9	2.8
Distillate fuel oil	22.9	23.1	22.4	23.1	22.4	23.1	23.2	23.9	22.8	23.0
Residual fuel oil	14.7	14.4	12.9	11.8	11.2	10.5	9.6	8.6	8.2	8.0
Jet fuel	2.3	2.2	2.6	3.2	3.0	3.1	3.3	3.1	5.6	5.8
Lubricating oil	2.0	1.9	1.8	1.9	2.0	2.0	2.0	2.0	2.0	1.9
Wax	.2	.2	.2	.2	.2	.2	.1	.1	.2	.2
Coke	1.1	1.2	1.3	1.4	2.0	2.5	2.6	2.6	2.6	2.6
Asphalt	3.1	3.0	3.2	3.3	3.3	3.4	3.5	3.5	3.5	3.7
Road oil	.3	.2	.2	.2	.2	.2	.2	.2	.2	.2
Still gas	4.2	4.3	4.4	4.3	4.4	4.2	4.3	4.0	4.0	4.1
Liquefied gases	1.8	1.9	2.0	2.3	2.6	2.7	2.5	1.8	3.3	3.1
Petrochemical feedstocks	[4]NA	[4]NA	[4]NA	[4]NA	[4]NA	[4]NA	[4]NA	2.8	1.8	1.7
Other finished products	.4	.5	.7	.7	.8	.8	.9	.4	.4	.4
Shortage	—.6	—.5	—.8	—1.1	—1.9	—2.1	—2.0	—2.2	—2.4	—24.
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

p Preliminary. NA Not Available.
[1] Other unfinished oils to crude in computing yields.
[2] New basis, comparable with 1965 data.
[3] Included with gasoline.
[4] Included with gasoline, kerosine, distillate fuel oil, residual fuel oil, liquefied petroleum gases, and miscellaneous and unfinished oils.

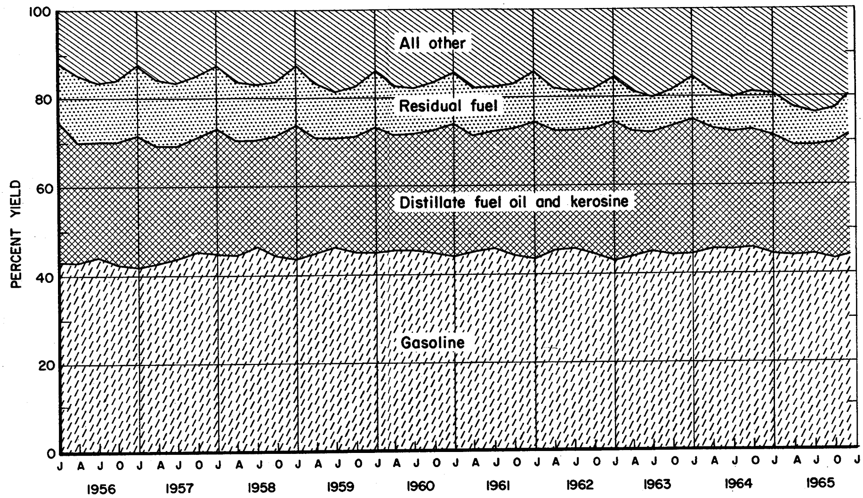

Figure 7.—Yields of principal products from crude runs to stills in the United States 1956–65, by quarters.

Table 41.—Input and output at refineries in the United States, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1964:													
Input:													
Crude petroleum:													
Domestic	236,007	222,164	234,360	223,888	231,815	227,667	239,203	239,215	229,188	233,676	226,253	242,459	2,785,895
Foreign	35,586	33,120	33,996	33,527	34,675	38,832	40,427	40,071	37,969	38,689	34,661	35,881	437,434
Total crude petroleum	271,593	255,284	268,356	257,415	266,490	266,499	279,630	279,286	267,157	272,365	260,914	278,340	3,223,329
Unfinished oils rerun (net)	3,992	1,937	117	—1,860	1,783	3,759	6,144	2,987	950	2,236	2,381	2,896	27,322
Total crude and unfinished oils rerun	275,585	257,221	268,473	255,555	268,273	270,258	285,774	282,273	268,107	274,601	263,295	281,236	3,250.651
Natural gas liquids	17,849	16,504	16,796	15,866	16,466	16,403	17,812	18,016	19,041	18,569	19,733	20,209	213,264
Benzol	9	3	1	1	2	1	2	3	2	1	1	3	29
Output:													
Gasoline, total [1]	137,546	128,192	135,462	129,467	135,562	135,842	144,142	144,431	137,740	141,818	136,429	142,769	1,649,400
Motor gasoline	133,031	123,866	131,572	125,479	131,607	131,479	139,892	140,458	133,327	137,578	132,028	137,869	1,598,186
Aviation gasoline	4,515	4,326	3,890	3,988	3,955	4,363	4,250	3,973	4,413	4,240	4,401	4,900	51,214
Special naphthas	1,929	2,245	1,938	2,394	2,363	2,092	2,488	2,293	1,826	2,112	2,089	2,109	25,878
Kerosine [1]	11,299	9,112	8,095	6,398	5,699	5,392	6,067	6,760	7,546	8,378	8,128	10,600	93,474
Distillate fuel oil [1]	67,443	62,812	61,681	57,525	60,775	61,092	64,184	61,986	59,347	59,552	58,881	66,768	742.046
Residual fuel oil	25,826	22,747	22,298	21,231	20,821	19,519	21,556	21,114	21,280	22,001	23,326	25,106	266,825
Jet fuel [1, 2]	13,547	13,351	15,186	14,810	15,268	15,856	16,452	16,892	15,129	15,532	15,473	14,635	182,131
Lube oil, total	5,150	4,828	5,207	5,285	5,397	5,250	5,357	5,415	5,284	5,431	5,347	5,717	63,668
Bright stock	667	519	548	535	492	586	467	729	517	525	586	569	6,740
Neutral	1,760	1,705	2,019	2,063	1,896	1,961	2,052	1,744	2,103	2,123	2,158	2,077	23,661
Other grades	2,723	2,604	2,640	2,687	3,009	2,703	2,838	2,942	2,664	2,783	2,603	3,071	33,267
Wax, total [3]	404	409	456	443	491	446	438	433	435	473	475	449	5,352
Microcrystalline	57	78	79	85	108	88	104	63	94	77	81	86	1,000
Fully refined	191	250	233	208	269	249	248	226	253	255	256	251	2,889
Other	156	81	144	150	114	109	86	144	88	141	138	112	1,463
Coke [3]	7,200	6.715	7,287	6,831	7,045	7,180	7,505	7,075	6,747	6,910	6,770	7,060	84,325
Asphalt [3]	4,435	5,556	7,286	7,995	11,168	12,743	13,582	13,658	12,474	11,712	8,191	6,079	114.879
Road oil	155	188	543	447	512	948	1,282	959	513	328	332	164	6,371
Still gas for fuel	10,617	9,942	10,820	10,618	11,212	11,654	12,208	11,479	10,935	10,539	10,438	10,795	131,257
Liquefied refined gases, total	8,874	8,436	9,417	9,046	8,959	9,129	9,273	8,830	8,507	8,912	8,192	8.937	106,512
For fuel use	5,030	4,680	5,208	4,788	5,179	5,061	5,136	4,932	4,643	4,869	4,625	5,093	59.244
For chemical use	3,844	3,756	4,209	4,258	3,780	4,068	4,137	3,898	3,864	4,043	3,567	3,844	47.268
Petrochemical feedstocks, total	5,119	4,459	4,842	4,623	4,601	4,615	5,017	4,807	4,843	4,728	4,923	5,001	57,578
Still gas	730	664	718	672	647	511	649	639	601	641	619	607	7,698
Naphtha 400°	2.409	1,884	2,059	1,960	1,924	2,077	2,147	1,947	2,017	1,764	2,253	2,216	24,657
Other	1,980	1,911	2,065	1,991	2,030	2,027	2,221	2,221	2,225	2,323	2,051	2,178	25.223
Miscellaneous products [1]	1,182	1,024	1,057	1,075	1,065	1,284	1,186	1,076	1,081	1,110	1,175	1,268	13.583
Shortage (or overage)	—7,283	—6,288	—6,305	—6,766	—6,197	—6,380	—7,149	—6,916	—6,537	—6,365	—7,140	—6,009	—79,335

See footnotes at end of table.

1965:p													
Input:													
Crude petroleum:													
Domestic	241,431	218,033	236,728	224,879	234,242	233,094	246,043	245,571	227,740	242,641	242,223	255,196	2,847,821
Foreign	35,650	32,275	38,483	37,448	38,673	40,020	42,636	40,485	42,501	39,052	33,803	31,995	453,021
Total crude petroleum	277,081	250,308	275,211	262,327	272,915	273,114	288,679	286,056	270,241	281,693	276,026	287,191	3,300,842
Unfinished oils rerun (net)	5,247	5,914	—323	—1,247	1,578	818	3,375	5,890	4,149	—1,153	2,582	5,281	32,111
Total crude and unfinished oils rerun	282,328	256,222	274,888	261,080	274,493	273,932	292,054	291,946	274,390	280,540	278,608	292,472	3,332,953
Natural gas liquids	19,626	17,163	18,255	17,564	16,946	17,489	18,241	19,007	19,002	20,408	20,451	21,524	225,676
Benzol	2	2	1	3	1	1	------	------	------	------	2	1	13
Output:													
Gasoline, total [1]	144,580	129,689	138,733	132,609	136,781	140,644	147,716	149,531	139,721	141,656	141,616	150,465	1,693,741
Motor gasoline	139,889	125,886	134,702	128,817	132,457	136,662	143,553	145,393	135,648	137,886	137,734	146,545	1,645,172
Aviation gasoline	4,691	3,803	4,031	3,792	4,324	3,982	4,163	4,138	4,073	3,770	3,882	3,920	48,569
Special naphthas [1]	2,294	2,252	2,349	2,253	2,223	2,601	2,444	2,375	2,366	2,471	2,482	2,624	28,734
Kerosine [1]	9,543	8,516	8,299	6,825	6,515	6,983	6,665	6,514	6,787	8,002	8,231	10,269	93,149
Distillate fuel oil [1]	66,765	60,930	62,188	58,544	61,453	58,692	65,497	66,370	62,744	65,652	66,112	70,124	765,071
Residual fuel oil	25,300	22,396	24,657	22,009	21,266	20,923	21,635	21,112	19,464	22,365	22,847	24,593	268,567
Jet fuel, total [1]	14,873	13,714	16,002	15,737	16,895	15,645	16,803	16,039	15,990	16,496	16,229	16,632	191,055
Naphtha-type	6,065	6,002	7,050	6,635	7,477	6,681	6,987	7,365	7,056	7,221	6,806	7,071	82,416
Kerosine-type	8,808	7,712	8,952	9,102	9,418	8,964	9,816	8,674	8,934	9,275	9,423	9,561	108,639
Lube oil, total	4,948	4,869	5,462	5,304	5,580	5,075	5,401	5,421	5,110	5,149	5,136	5,470	62,925
Bright stock	563	544	670	528	675	514	531	615	511	580	546	597	6,874
Neutral	1,845	1,975	2,077	2,044	2,035	1,913	2,186	2,112	2,007	1,824	2,097	2,130	24,245
Other grades	2,540	2,350	2,715	2,732	2,870	2,648	2,684	2,694	2,592	2,745	2,493	2,743	31,806
Wax, total [3]	473	373	480	456	488	442	434	474	445	464	442	485	5,456
Microcrystalline	79	70	75	84	86	71	70	80	68	80	75	79	917
Fully refined	247	204	266	237	273	245	251	252	252	303	267	275	3,072
Other	147	99	139	135	129	126	113	142	125	81	100	131	1,467
Coke [3]	7,478	7,031	7,240	6,660	6,948	7,035	7,374	7,445	7,214	6,792	7,058	7,765	86,040
Asphalt [3]	5,724	5,720	7,441	8,263	12,166	12,077	14,383	14,645	13,471	12,615	9,776	7,323	123,604
Road oil	256	249	338	358	637	953	1,213	1,156	579	506	148	172	6,565
Still gas for fuel	11,322	10,441	11,175	10,635	11,405	11,600	12,442	12,336	11,208	10,955	10,644	11,132	135,295
Liquefied refined gases, total	8,807	8,677	9,500	8,878	9,346	9,049	9,228	8,962	8,552	8,412	8,226	9,199	106,836
For fuel use	4,818	4,789	4,794	4,502	4,852	4,839	4,893	4,780	4,291	4,309	4,184	5,074	56,125
For chemical use	3,989	3,888	4,706	4,376	4,494	4,210	4,335	4,182	4,261	4,103	4,042	4,125	50,711
Petrochemical feedstocks, total	4,836	4,417	5,058	4,561	4,560	4,791	4,733	4,814	5,120	4,908	5,346	4,707	57,851
Still gas	909	633	786	759	846	751	681	676	656	732	672	765	8,866
Naphtha 400°	2,147	1,872	2,423	1,730	1,603	1,931	1,987	1,921	2,308	2,091	2,622	1,936	24,571
Other	1,780	1,912	1,849	2,072	2,111	2,109	2,065	2,217	2,156	2,085	2,052	2,006	24,414
Miscellaneous products [1]	1,186	938	1,144	1,010	1,220	1,239	1,258	1,333	1,252	1,122	1,118	1,174	13,994
Shortage (or overage)	—6,429	—6,825	—6,922	—5,455	—6,043	—6,327	—6,931	—7,574	—6,631	—6,617	—6,350	—8,137	—80,241

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[1] Production at natural gas processing plants shown as direct transfers and omitted from the input and output at refineries.
[2] Separate data for naphtha-type and kerosine-type jet fuels are not available.
[3] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton.

Table 42.—Input and output at refineries in the United States, by districts

(Thousand barrels)

	PAD district I			PAD district II					PAD district III						PAD district IV	PAD district V	United States
	East Coast	Appalachian #1	Total	Appalachian #2	Indiana, Illinois, etc.	Minnesota, Wisconsin, etc.	Oklahoma, Kansas, etc.	Total	Texas Inland	Texas Gulf Coast	Louisiana Gulf Coast	Arkansas, Louisiana Inland etc.	New Mexico	Total	Other Rocky Mountain	West Coast	
1965: p																	
Input:																	
Crude petroleum:																	
Domestic	147,772	30,793	178,565	36,896	584,210	26,678	276,908	924,692	117,086	772,593	332,482	45,948	11,559	1,279,668	115,690	349,206	2,847,821
Foreign	249,801	9,615	259,416	-----	11,598	29,158	-----	40,756	-----	-----	27	46	-----	73	4,861	147,915	453,021
Total crude petroleum	397,573	40,408	437,981	36,896	595,808	55,836	276,908	965,448	117,086	772,593	332,509	45,994	11,559	1,279,741	120,551	497,121	3,300,842
Unfinished oils rerun (net)	40,551	860	41,411	1,085	−1,593	−27	604	69	970	−15,924	−4,410	1,239	−10	−18,135	−385	9,151	32,111
Total crude and unfinished rerun	438,124	41,268	479,392	37,981	594,215	55,809	277,512	965,517	118,056	756,669	328,099	47,233	11,549	1,261,606	120,166	506,272	3,332,953
Natural gas liquids	5,909	13	5,922	863	22,513	2,156	19,241	44,773	23,766	91,716	21,377	7,178	1,074	145,111	4,944	24,926	225,676
Benzol	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	13	-----	13
Output:																	
Gasoline, total [1]	201,531	16,609	218,140	19,689	316,836	28,344	160,001	524,870	79,286	386,281	161,920	24,501	7,069	659,057	59,602	232,072	1,693,741
Motor gasoline	198,938	16,604	215,542	19,688	311,620	28,344	158,634	518,286	75,364	375,011	149,514	24,501	7,069	631,459	58,677	221,208	1,645,172
Aviation gasoline	2,593	5	2,598	1	5,216	-----	1,367	6,584	3,922	11,270	12,406	-----	-----	27,598	925	10,864	48,569
Special naphthas [1]	1,428	449	1,877	165	3,849	-----	2,082	6,096	1,131	14,861	433	715	-----	17,140	525	3,096	28,734
Kerosine [1]	9,106	1,150	10,256	745	17,731	2,022	3,262	23,760	1,526	39,668	12,899	1,896	189	56,178	2,509	446	93,149
Distillate fuel oil [1]	115,748	9,787	125,535	7,482	126,421	13,313	68,315	215,531	18,830	207,274	82,164	10,575	2,006	320,849	26,906	76,250	765,071
Residual fuel oil	32,069	3,713	35,782	3,166	48,391	6,749	3,519	61,825	4,109	35,481	14,072	2,748	360	56,770	11,593	102,597	268,567
Jet fuel, total [1]	8,138	882	9,020	1,278	24,948	2,131	15,013	43,370	15,576	36,152	30,251	1,375	1,393	84,747	6,567	47,351	191,055
Naphtha-type	2,301	753	3,054	76	8,770	2,106	6,961	17,913	10,221	15,777	9,878	1,295	1,393	38,564	5,579	17,306	82,416
Kerosine-type	5,837	129	5,966	1,202	16,178	25	8,052	25,457	5,355	20,375	20,373	80	-----	46,183	988	30,045	108,639
Lube oil, total	7,753	3,476	11,229	420	5,729	-----	5,134	11,283	173	25,045	7,068	1,992	-----	34,278	448	5,687	62,925
Bright stock	890	1,119	2,009	25	730	-----	493	1,248	17	1,931	797	377	-----	3,122	37	458	6,874
Neutral	2,638	1,601	4,239	75	4,536	-----	3,181	7,792	-----	4,913	5,400	115	-----	10,428	263	1,523	24,245
Other grades	4,225	756	4,981	320	463	-----	1,460	2,243	156	18,201	871	1,500	-----	20,728	148	3,706	31,806
Wax [2]	2,030	429	2,459	78	450	-----	505	1,033	71	961	409	-----	-----	1,441	101	422	5,456
Coke [2]	13,766	236	14,002	473	17,285	2,395	7,784	27,937	2,145	17,741	7,772	2,098	123	29,879	3,388	10,834	86,040
Asphalt [2]	28,366	1,336	29,702	3,486	23,723	1,797	12,653	41,659	5,865	7,853	7,738	5,829	812	28,097	7,435	16,711	123,604
Road oil	11	617	628	-----	2,044	158	1,403	3,605	-----	28	-----	-----	-----	28	1,262	1,042	6,565
Still gas for fuel	18,556	1,726	20,282	1,765	26,720	1,476	11,464	41,425	5,459	26,555	10,566	2,204	340	45,124	4,352	24,112	135,295
Liquefied refined gases, total	12,591	762	13,353	550	11,027	986	7,107	19,670	2,832	43,466	12,692	1,030	214	60,234	1,438	12,141	106,836
For fuel use	9,126	762	9,888	550	9,271	986	7,040	17,847	2,678	8,534	7,123	809	214	19,358	1,437	7,595	56,125
For chemical use	3,465	-----	3,465	-----	1,756	-----	67	1,823	154	34,932	5,569	221	-----	40,876	1	4,546	50,711
Petrochemical feedstocks, total	4,028	262	4,290	-----	7,181	-----	597	7,778	3,942	24,255	12,425	274	151	41,047	274	4,462	57,851
Still gas	1,643	-----	1,643	-----	1,351	-----	-----	1,351	-----	4,461	-----	-----	-----	4,461	-----	1,411	8,866
Naphtha 400°	1,996	-----	1,996	-----	3,520	-----	589	4,109	1,299	13,821	881	49	-----	16,050	1	2,415	24,571
Other	389	262	651	-----	2,310	-----	8	2,318	2,643	5,973	11,544	225	151	20,536	273	636	24,414
Miscellaneous [1]	1,791	178	1,969	32	1,021	93	2,424	3,570	1,221	4,359	57	14	-----	5,651	255	2,549	13,994
Shortage or (overage)	−12,879	−331	−13,210	−485	−16,628	−1,499	−4,510	−23,122	−344	−21,595	−10,990	−840	−34	−33,803	−1,532	−8,574	−80,241

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[1] Production at natural gas processing plants shown as direct transfers and omitted from the input and output at the refineries.

[2] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton.

Table 43.—Petroleum refinery capacity in the United States and Puerto Rico,[1] January 1, 1961 to January 1, 1966

Year	Number of refineries				Crude-oil throughput capacity (barrels per day)				
						Shutdown			
	Operating	Shut down	Total	Building	Operating	Operable	Inoperable	Total	Building
1961	289	22	311	---	9,629,685	368,888	11,500	10,010,073	36,500
1962	287	24	311	1	9,812,248	220,799	72,100	10,105,147	110,350
1963	287	21	308	2	9,814,791	196,130	107,400	10,118,321	178,300
1964	282	22	304	1	10,063,164	242,610	79,600	10,385,374	54,700
1965	275	27	302	1	10,161,311	258,540	354,744	10,774,595	74,960
1966	271	20	291	1	10,172,059	222,680	98,900	10,493,639	455,300

[1] Includes Puerto Rico for 1965 and 1966 only.

GASOLINE

The total demand for gasoline in 1965 averaged 4,726,000 barrels daily. This included a demand for motor gasoline of 4,594,000 barrels daily and 132,000 barrels for aviation gasoline. Special naphthas are now reported under a separate category.

Registering a gain of 4.3 percent for the year, the domestic demand for motor gasoline averaged 4,592,000 barrels daily in 1965. Demand in the fourth quarter was exceptionally high because of mild weather. The demand for aviation gasoline continued to decline, losing ground in both the domestic and export market to the jet type fuels.

Civilian highway use of gasoline, as calculated from data compiled by the Bureau of Public Roads, totaled 1,594.7 million barrels in 1965, compared with 1,530.2 barrels in 1964. Nonhighway motor vehicles, military vehicles, stationary and marine engines, and losses consumed the remainder (81.5 million barrels).

The new supply of motor gasoline in 1965 was 1,666 million barrels. This included 1,645 million barrels produced at refineries, 11 million barrels at natural gasoline plants, and 10 million barrels imported from foreign countries. The average yield of motor gasoline from crude oil increased from 42.0 percent in 1964 to 42.6 percent in 1965.

Stocks of motor gasoline were high at the beginning of 1965 resulting in a soft market and depressed prices, especially in the area east of the Rocky Mountains. This situation continued until May when inventories were reduced to previous-year levels. By the end of 1965 these stocks were down 11,049,000 barrels.

Table 47 shows consumption of motor gasoline by PAD districts and the interdistrict shipments.

Military purchases of aviation-grade gasoline were 22.2 million barrels in 1965 and motor gasoline purchases totaled 6.0 million barrels compared with 36.6 million and 6.1 million barrels, respectively, in 1964.

Data on pipeline movements, tidewater, river, and lake shipments are shown in the transportation section of this chapter.

Table 50 shows the distribution of aviation fuels by PAD districts and type of consumer. With the exception of general aviation use (private aircraft), all use segments of aviation gasoline continued to decline.

KEROSINE

Reversing the downward trend of the past 2 years, kerosine demand, exclusive of that used as commercial jet fuel, showed a substantial increase for the year. Total demand in 1965 was 97.8 million barrels compared with 92.9 million in 1964.

Kerosine used for commercial jet aircraft is now reported under another section of this chapter along with military jet fuel.

DISTILLATE FUEL OIL

The total demand for distillate fuel oil increased 3.4 percent in 1965. Domestic demand averaged 2,126,000 barrels per day, an increase of 3.7 percent; however exports averaged only 10,100 barrels per day or 31.8 percent below the 1964 levels. Industrial activity and weather factors influence distillate oil demand. Heating represents the major use for distillate fuel oil and the weather in 1965, based on degree days, was

Table 44.—Number and capacity of petroleum refineries in the United States, by Bureau of Mines Refining Districts, January 1, 1966

Refining district	Petroleum refineries (number)			Crude-oil distillation, crude-oil throughput capacity (barrels per calendar day)				Cracking and reforming capacity, gasoline output capacity [1] (barrels per calendar day)			
	Total	Operating	Shutdown	Operating	Shutdown	Total	Building	Operating	Shutdown	Total	Building
Refining district:											
East Coast	23	19	4	1,266,400	140,700	1,407,100	4,300	466,760	8,850	475,610	37,500
Appalachian No. 1	13	13	--	124,600	3,000	127,600	-------	46,975	2,280	49,255	-------
Appalachian No. 2	4	3	1	115,000	6,000	121,000	-------	41,160	300	41,460	-------
Indiana-Illinois-Kentucky	49	48	1	1,789,040	19,880	1,808,920	61,500	730,838	21,600	752,438	35,200
Minnesota-Wisconsin	7	6	1	172,000	5,000	177,000	2,500	50,880	500	51,380	2,500
Oklahoma-Kansas	32	30	2	838,330	40,000	878,330	-------	362,788	21,200	383,988	600
Texas Inland	27	24	3	370,752	27,100	397,852	-------	135,840	17,550	153,390	-------
Texas Gulf Coast	28	26	2	2,358,350	33,900	2,392,250	161,000	879,085	16,650	895,735	66,300
Louisiana Gulf Coast	10	10	--	951,750	-------	951,750	143,000	343,090	-------	343,090	77,600
Arkansas-Louisiana Inland	17	17	--	156,092	-------	156,092	-------	50,350	580	50,930	-------
New Mexico	7	7	--	35,175	-------	35,175	2,500	12,100	-------	12,100	700
Other Rocky Mountain	33	29	4	386,950	12,600	399,550	5,500	148,280	3,810	152,090	2,200
West Coast	39	38	1	1,607,620	33,400	1,641,020	75,000	593,075	20,445	613,520	120,455
United States total:											
1966	289	270	19	10,172,059	[2] 321,580	10,493,639	[3] 455,300	3,861,221	[2] 113,765	3,974,986	[3] 343,055
1965	300	273	27	10,161,311	[2] 613,284	10,774,595	74,960	3,781,832	[2] 120,570	3,902,402	[3] 151,425

[1] Capacity expressed in terms of gasoline production.
[2] Includes capacity considered inoperable without extensive repairs. Crude oil: 1966, 98,900; 1965, 354,744; cracked and reformed gasoline capacity: 1966, 26,695; 1965, 23,850. All other figures represent operable capacity shutdown.
[3] Includes capacity under construction for replacement. Crude oil: California 34,000; Louisiana, 120,000; and Texas 153,000, and for cracked and reformed gasoline: 1966, Louisiana, 2,900; North Dakota, 600; and Pennsylvania, 10,000; 1965, Texas, 450. All other figures represent additional capacity under construction.

Table 45.—Salient statistics of motor and aviation gasoline in the United States, 1964–65, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
							1964						
Production:													
Gasoline produced at refineries:													
Motor gasoline	133,060	123,893	131,601	125,507	131,637	131,509	139,914	140,484	133,354	137,607	132,057	137,894	1,598,517
Aviation gasoline	4,515	4,326	3,890	3,988	3,955	4,363	4,250	3,973	4,413	4,240	4,401	4,900	51,214
Motor gasoline produced at natural gasoline plants	1,064	923	1,083	1,002	1,014	990	875	840	907	941	1,077	854	11,570
Total gasoline production	138,639	129,142	136,574	130,497	136,606	136,862	145,039	145,297	138,674	142,788	137,535	143,648	1,661,301
Daily average	4,472	4,612	4,406	4,350	4,407	4,562	4,679	4,689	4,622	4,606	4,584	4,634	4,539
Stocks, end of period:													
Motor gasoline	189,038	199,589	206,052	200,280	197,120	185,262	177,686	177,463	175,416	174,266	183,756	185,766	185,766
Aviation gasoline	9,077	9,924	9,056	9,139	8,797	8,279	8,159	7,851	7,601	7,348	7,688	7,867	7,867
Total stocks	198,115	209,513	215,108	209,419	205,917	193,541	185,845	185,314	183,017	181,614	191,444	193,633	193,633
Imports:													
Motor gasoline	603	561	1,005	1,009	1,453	778	746	955	700	937	811	924	10,482
Exports:													
Motor gasoline	37	25	70	68	51	38	159	29	106	27	32	41	683
Aviation gasoline	538	169	427	421	466	311	559	560	287	534	570	684	5,526
Total exports	575	194	497	489	517	349	718	589	393	561	602	725	6,209
Domestic demand:													
Motor gasoline	122,880	114,801	127,156	133,222	137,213	145,097	148,952	142,473	136,902	140,608	124,423	137,621	1,611,348
Aviation gasoline	3,637	3,310	4,331	3,484	3,831	4,570	3,811	3,721	4,376	3,959	3,491	4,037	46,558
Total domestic demand	126,517	118,111	131,487	136,706	141,044	149,667	152,763	146,194	141,278	144,567	127,914	141,658	1,657,906
							1965 p						
Production:													
Gasoline produced at refineries:													
Motor gasoline	139,889	125,886	134,702	128,817	132,457	136,662	143,553	145,393	135,648	137,886	137,734	146,545	1,645,172
Aviation gasoline	4,691	3,803	4,031	3,792	4,324	3,982	4,163	4,138	4,073	3,770	3,882	3,920	48,569
Motor gasoline produced at natural gasoline plants	1,001	819	934	816	1,082	959	803	862	812	763	874	935	10,660
Total gasoline production	145,581	130,508	139,667	133,425	137,863	141,603	148,519	150,393	140,533	142,419	142,490	151,400	1,704,401
Daily average	4,696	4,661	4,505	4,447	4,447	4,720	4,791	4,851	4,684	4,594	4,750	4,884	4,670

Table 45.—Salient statistics of motor and aviation gasoline in the United States, 1964–65, by months—Continued

(Thousand barrels)

	1965 p												
	January	February	March	April	May	June	July	August	September	October	November	December	Total
Stocks, end of period:													
Motor gasoline	205,734	216,576	216,063	208,331	197,102	184,318	176,901	173,338	171,527	168,229	171,203	174,717	174,717
Aviation gasoline	8,191	8,467	8,848	9,022	8,509	8,245	8,186	8,452	8,743	8,379	8,044	8,341	8,341
Total stocks	213,925	225,043	224,911	217,353	205,611	192,563	185,087	181,790	180,270	176,608	179,247	183,058	183,058
Imports:													
Motor gasoline	513	489	912	304	469	1,256	1,040	1,030	722	1,205	619	1,493	10,052
Exports:													
Motor gasoline	37	57	60	127	102	45	33	50	33	72	48	49	713
Aviation gasoline	797	225	262	295	382	695	271	315	277	205	368	67	4,159
Total exports	834	282	322	422	484	740	304	365	310	277	416	116	4,872
Domestic demand:													
Motor gasoline	121,398	116,295	137,001	137,542	145,135	151,616	152,780	150,798	138,960	143,080	136,205	145,410	1,676,220
Aviation gasoline	3,570	3,302	3,388	3,323	4,455	3,551	3,951	3,557	3,505	3,929	3,849	3,556	43,936
Total domestic demand	124,968	119,597	140,389	140,865	149,590	155,167	156,731	154,355	142,465	147,009	140,054	148,966	1,720,156

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Table 46.—Production of gasoline at refineries and natural gasoline plants in the United States in 1965,[p] by districts and months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Motor gasoline at refineries:													
East Coast	17,670	15,985	16,807	15,509	16,352	17,488	17,140	17,721	16,465	15,630	15,063	17,108	198,938
Appalachian No. 1	1,454	1,286	1,542	1,368	1,295	1,292	1,334	1,444	1,189	1,518	1,383	1,499	16,604
Appalachian No. 2	1,817	1,532	1,553	1,336	1,565	1,607	1,616	1,623	1,706	1,732	1,754	1,847	19,688
Indiana, Illinois, Kentucky, etc.	26,047	23,298	25,497	23,104	24,237	26,197	27,631	27,963	26,579	26,779	26,181	28,107	311,620
Minnesota, Wisconsin, etc.	2,599	2,205	2,339	2,170	2,183	1,990	2,714	2,704	2,018	1,913	2,616	2,893	28,344
Oklahoma, Kansas, etc.	13,630	12,140	13,554	12,443	12,449	11,867	13,733	14,556	13,521	12,994	13,347	14,400	158,634
Texas Inland	6,702	5,674	5,944	6,067	6,006	6,271	6,531	6,638	6,317	6,503	6,361	6,350	75,364
Texas Gulf Coast	31,343	28,710	30,101	29,770	31,071	31,249	32,404	32,009	31,120	31,773	31,731	33,730	375,011
Louisiana Gulf Coast	12,850	11,075	12,029	11,850	12,190	12,445	13,225	13,101	10,375	12,806	13,127	14,441	149,514
Arkansas, Louisiana Inland, etc.	2,078	1,924	2,077	2,045	2,131	1,870	1,984	2,146	1,966	2,030	2,046	2,204	24,501
New Mexico	540	533	584	439	515	595	589	727	597	653	644	653	7,069
Rocky Mountain	5,036	4,533	4,549	4,212	4,244	4,929	4,9[illegible]8	5,445	5,244	4,992	5,027	5,518	58,677
West Coast	18,123	16,991	18,126	18,504	18,219	18,862	19,704	19,316	18,551	18,563	18,454	17,795	221,208
Total motor gasoline at refineries	139,889	125,886	134,702	128,817	132,457	136,662	143,553	145,393	135,648	137,886	137,734	146,545	1,645,172
Aviation gasoline at refineries:													
East Coast	181	219	210	166	241	223	248	232	263	226	176	208	2,593
Appalachian No. 1	------	------	------	------	------	------	------	------	------	------	5	------	5
Appalachian No. 2	------	------	------	------	------	------	------	------	------	1	------	------	1
Indiana, Illinois, Kentucky, etc.	484	534	428	358	402	363	384	532	486	331	448	466	5,216
Minnesota, Wisconsin, etc.	------	------	------	------	------	------	------	------	------	------	------	------	--------
Oklahoma, Kansas, etc.	128	114	89	127	170	80	111	131	115	71	123	108	1,367
Texas Inland	388	296	285	278	302	292	351	294	350	327	367	392	3,922
Texas Gulf Coast	968	837	1,161	833	1,146	920	874	1,235	800	905	771	820	11,270
Louisiana Gulf Coast	1,110	1,020	1,009	1,174	1,080	1,164	1,111	967	917	1,032	977	845	12,406
Arkansas, Louisiana Inland, etc.	------	------	------	------	------	------	------	------	------	------	------	------	--------
New Mexico	------	------	------	------	------	------	------	------	------	------	------	------	--------
Rocky Mountain	65	85	89	89	51	117	76	84	83	62	59	65	925
West Coast	1,367	698	760	767	932	823	1,008	663	1,059	815	956	1,016	10,864
Total aviation gasoline at refineries	4,691	3,803	4,031	3,792	4,324	3,982	4,163	4,138	4,073	3,770	3,882	3,920	48,569
Motor gasoline produced at natural gasoline plants:													
East Coast	------	------	------	------	------	------	------	------	------	------	------	------	--------
Appalachian No. 1	------	------	------	------	------	------	------	------	------	------	------	------	--------
Appalachian No. 2	------	------	------	------	------	------	------	------	------	------	------	------	--------
Indiana, Illinois, Kentucky, etc.	------	------	------	------	------	------	------	------	------	------	------	------	--------
Minnesota, Wisconsin, etc.	------	------	------	------	------	------	------	------	------	------	------	------	--------
Oklahoma, Kansas, etc.	------	------	1	1	1	1	1	1	1	1	------	1	9
Texas Inland	386	344	378	358	415	352	311	344	229	218	244	240	3,819
Texas Gulf Coast	44	37	40	38	44	43	41	47	43	34	37	34	482
Louisiana Gulf Coast	264	205	239	154	210	153	195	194	212	181	313	312	2,632
Arkansas, Louisiana Inland, etc.	307	233	276	265	412	410	255	276	327	329	280	348	3,718

Table 46.—Prduction of gasoline at refineries and natural gasoline plants in the United States in 1965,[p] by districts and months—Continued

(Thousand barrel)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
New Mexico	------	------	------	------	------	------	------	------	------	------	------	------	--------
Rocky Mountain	------	------	------	------	------	------	------	------	------	------	------	------	--------
West Coast	------	------	------	------	------	------	------	------	------	------	------	------	--------
Total gasoline at natural gasoline plants	1,001	819	934	816	1,082	959	803	862	812	763	874	935	10,660
Total gasoline produced at refineries and natural gasoline plants: 1965	145,581	130,508	139,667	133,425	137,863	141,603	148,519	150,393	140,533	142,419	142,490	151,400	1,704,401
1964	138,639	129,142	136,574	130,497	136,606	136,862	145,039	145,297	138,674	142,788	137,535	148,648	1,661,301

[p] Preliminary figures.

Table 47. Consumption, production, and distribution of motor gasoline in 1965 [1] by PAD districts

	PAD districts					
	I	II	III	IV	V	Total
Consumption [2]	582.2	589.0	211.7	48.5	242.7	1674.1
Supply:						
Production [3]	215.5	519.3	640.0	59.9	221.2	1655.9
Imports	9.2	-----	-----	-----	.9	10.1
Received from other districts:						
From I	-----	26.1	.1	-----	-----	-----
From II	4.8	-----	14.5	.1	-----	-----
From III	376.9	66.8	-----	3.4	16.2	-----
From IV	-----	3.4	-----	-----	10.0	-----
From V	.5	-----	-----	2.4	-----	-----
Total receipts	382.2	96.3	14.6	5.9	26.2	-----
Total supply	606.9	615.6	654.6	65.8	248.3	1666.0
Stock change [4]	—.7	—6.5	—2.7	—.4	—.6	—10.9
Shipped to other districts	26.2	19.4	463.3	13.4	2.9	-----
Exports	.1	-----	.1	-----	.5	.7
Domestic demand	581.3	602.7	193.9	52.8	245.5	1676.2
Difference between consumption and demand	+.9	—13.7	+17.8	—4.3	—2.8	—2.1

[1] Apparent distribution of motor gasoline, by districts, is based on pipeline, tidewater, and river shipments compiled by the Bureau of Mines. An estimate of annual interdistrict railroad shipshipments was computed from 1963 data compiled by the Bureau of Transport Economics, Interstate Commerce Commission, and records compiled by the San Francisco office of the Bureau of Mines. Information on shipments moving from PAD district 2 by way of the Great Lakes and the Ohio River to PAD district 1 were compiled from data supplied by the U.S. Army Corps of Engineers.

[2] Compiled from data supplied by the Bureau of Public Roads.

[3] Includes motor gasoline produced at natural gas processing plants for which district breakdown is estimated.

[4] Adjusted to reflect "new basis" total.

almost 3 percent colder than the previous year. Diesel fuel use for trucks, trucktractors, buses, heavy construction machinery, and farm equipment has been expanding rapidly.

The Bureau of Mines classifies No. 4 fuel oil in the distillate fuel oil category. This is a blend of a residual fuel oil and a light distillate fuel oil. Since most of the blending occurs at storage or terminal facilities away from the refinery, the consumption data for distillate and residual fuel oils will not agree with apparent demand which is based on refinery production.

RESIDUAL FUEL OIL

The domestic demand for residual averaged 1,607,000 barrels daily in 1965, the highest level since 1959. The daily average increase for the year was 92,000 barrels and of this, 87,000 barrels occurred in district I where demand increased from 978,000 barrels per day in 1964 to 1,065,000 barrels per day in 1965. One of the major factors in the demand growth was fuel used by the electric utilities to fill increased power generation needs. This averaged 307,000 barrels daily in 1965 as compared with 256,000 barrels daily for the previous year. Refinery production of residual fuel oil increased about 1 percent; in 1965, however, the yield per barrel of crude oil processed continued to decline, decreasing from 8.2 percent to 8.0 percent.

Imports of residual fuel oil averaged 944,000 barrels daily for the year, 176,000 barrels of which were used for bunkering ships engaged in foreign trade and by the military for offshore use.

Exceptionally high demand in the last quarter of 1964 and the first quarter of 1965 resulted in heavy withdrawals from stocks. In establishing quotas in districts 1 through 4 for the April 1965 to March 1966 period, provisions were made in the import quotas to allow a stock buildup. By the end of 1965 residual fuel oil stocks totaled 56.2 million barrels, an increase of 15.8 million for the year; however only 1.4 million barrels of this increase was in district 1 whereas stocks in district 5 increased 10.4 million barrels.

Table 48.—Production (refinery output) and consumption of gasoline (excluding naphtha) in the United States, by States
(Thousand barrels)

	1963		1964		p 1965	
	Production	Consumption [1]	Production	Consumption [1]	Production	Consumption [1]
Alabama	(2)	26,777	(2)	28,374	(2)	29,613
Alaska	--------	1,624	--------	1,757	--------	1,898
Arizona	--------	14,288	--------	14,948	--------	15,356
Arkansas	12,697	16,824	12,895	17,616	13,572	18,423
California	[3] 214,726	162,945	[3] 219,843	173,160	[3] 232,072	177,090
Colorado	7,051	18,458	5,867	18.921	6,302	19.570
Connecticut	--------	21,249	--------	22,117	--------	23,068
Delaware	(4)	5,464	(4)	5,502	(4)	5,503
District of Columbia	--------	4,956	--------	5,244	--------	5,433
Florida	--------	50,164	--------	52,729	--------	55,342
Georgia	(5)	35,690	(5)	37,923	(5)	40,104
Hawaii	(3)	4,490	(3)	4,414	(3)	4,713
Idaho	--------	7,191	--------	7,461	--------	7,747
Illinois	112,187	81,966	117,746	84,671	118,032	87,796
Indiana	72,606	45,608	78,268	47,355	81,841	49,376
Iowa	--------	29,983	--------	30,467	--------	31,835
Kansas	65,329	27,233	66,088	26,827	68,158	26,754
Kentucky	[6] 16,188	24,395	[6] 17,524	25,409	[6] 18,401	26,601
Louisiana	[2] 147,659	24,959	[2] 167,444	26,868	[2] 172,849	28,615
Maine	--------	8,564	--------	8,902	--------	9,232
Maryland	(5)	25,355	(5)	26,467	(5)	27,537
Massachusetts	[4] 22,388	37,458	[4] 23,198	38,899	[4] 22,174	40,356
Michigan	23,710	71,542	24,989	75,394	25,486	79,494
Minnesota	12,725	34,348	15,027	35,216	15,362	36,227
Mississippi	(2)	17,999	(2)	18,513	(2)	18,976
Missouri	[7] 12,439	43,983	[7] 14,206	45,182	[7] 13,131	46,889
Montana	12,733	8,848	15,304	8,631	15,603	9,349
Nebraska	(7)	16,011	(7)	16,549	(7)	16,873
Nevada	--------	5,132	--------	5,413	--------	5,813
New Hampshire	--------	5,321	--------	5,609	--------	5,873
New Jersey	78,639	52,832	77,958	54,316	74,003	56,452
New Mexico	5,837	10,619	6,770	10,953	7,069	11,214
New York	12,696	117,586	14,056	123,252	12,849	122,829
North Carolina	--------	40,119	--------	42,554	--------	44,119
North Dakota	[8] 11,722	8,017	[8] 12,428	8,316	[8] 12,982	8,458
Ohio	82,851	81,547	86,754	85,539	92,765	88,453
Oklahoma	74,689	28,278	78,062	28,706	78,712	30,625
Oregon	--------	18,029	--------	19,056	--------	20,044
Pennsylvania	95,484	81,268	99,647	84,269	101,585	87,167
Rhode Island	(4)	6,270	(4)	6,415	(4)	6,677
South Carolina	(5)	19,472	(5)	20,345	(5)	21,481
South Dakota	--------	9,320	--------	9,117	--------	9,437
Tennessee	(6)	30,663	(6)	32,596	(6)	33,741
Texas	444,928	115,949	452,783	122.243	465,567	127,904
Utah	16,536	9,481	17,650	10,047	19,174	10,744
Vermont	--------	3,468	--------	3,590	--------	3,803
Virginia	[5] 6,752	34,276	[5] 6,482	36,127	[5] 6,887	38,105
Washington	(3)	30,004	(3)	28,686	(3)	29,351
West Virginia	731	12,101	555	12,407	642	12,968
Wisconsin	(8)	34,352	(8)	35,726	(8)	37,002
Wyoming	17,906	4,728	17,856	4,800	18,523	4,850
Total	1,581,209	1,627,204	1,649,400	1,695,598	1,693,741	1,757,699

p Preliminary.
[1] American Petroleum Institute.
[2] Alabama and Mississippi included with Louisiana.
[3] Washington and Hawaii included with California.
[4] Delaware and Rhode Island included with Massachusetts.
[5] Maryland, South Carolina. and Georgia included with Virginia.
[6] Tennessee included with Kentucky.
[7] Nebraska included with Missouri.
[8] Wisconsin included with North Dakota.

JET FUELS

The total demand for all jet fuels in 1965 was 221,175,000 barrels compared with 204,423,000 in 1964. The demand for naphtha type jets was 99,052,000 barrels. This type fuel is used principally by the military. The demand for kerosine type jet fuel, used mostly by commercial jet aircraft, was 122,123,000 barrels. The Bureau of Mines formerly treated all commercial jet fuel as a part of kerosine demand and all military jet fuel in a separate category. It was found that not all sales could be classified into these groups since both the commercial users and the military might,

Table 49.—Stocks of gasoline in the United States in 1965, by districts and months

(Thousand barrels)

	January 31	February 28	March 31	April 30	May 31	June 30	July 31	August 31	September 30	October 31	November 30	December 31
Motor gasoline:												
East Coast	49,505	48,815	48,436	47,945	48,584	46,324	44,644	44,386	44,092	45,903	44,543	44,505
Appalachian No. 1	5,684	5,735	6,015	5,854	5,588	5,157	5,319	4,847	4,901	4,901	4,680	4,558
Appalachian No. 2	3,498	3,323	3,435	3,116	3,085	2,995	3,012	2,913	3,122	3,197	3,164	3,059
Indiana, Illinois, Kentucky, etc.	35,779	38,421	39,418	37,478	34,109	30,668	29,037	27,807	28,465	27,625	27,396	28,279
Minnesota, Wisconsin, North Dakota and South Dakota	8,022	8,028	8,041	7,455	7,416	6,268	6,864	6,841	7,191	5,998	6,808	7,297
Oklahoma, Kansas, etc.	20,079	20,956	21,720	20,891	18,924	16,234	15,836	16,220	16,221	14,924	15,127	15,854
Texas Inland	8,709	8,975	8,647	8,499	8,065	6,901	6,308	6,126	6,246	6,729	6,914	7,395
Texas Gulf	25,565	28,037	26,998	24,575	20,492	20,673	19,702	19,558	19,379	17,478	19,500	21,444
Louisiana Gulf Coast	9,875	12,461	11,587	11,260	10,459	11,221	10,928	10,413	9,431	10,583	11,224	10,422
Arkansas, Louisiana Inland, etc.	8,796	8,878	9,414	9,246	9,090	8,375	8,397	8,521	7,615	6,166	5,797	5,704
New Mexico	736	917	931	875	835	723	757	788	774	869	832	762
Rocky Mountain	7,093	7,840	7,863	7,351	6,779	6,103	4,919	4,397	4,313	4,192	4,611	5,682
West Coast	22,393	24,190	23,558	23,786	23,676	22,676	21,178	20,521	19,777	19,714	20,607	19,756
Total motor gasoline	205,734	216,576	216,063	208,331	197,102	184,318	176,901	173,338	171,527	168,229	171,208	174,717
Aviation gasoline:												
East Coast	1,296	1,319	1,273	1,337	1,368	1,307	1,263	1,272	1,233	1,672	1,438	1,477
Appalachian No. 1	102	131	130	110	77	119	117	103	120	121	99	123
Appalachian No. 2	21	32	23	24	14	20	24	24	33	25	30	28
Indiana, Illinois, Kentucky, etc.	1,275	1,429	1,458	1,332	1,214	1,135	1,029	1,050	1,057	966	1,011	1,046
Minnesota, Wisconsin, North Dakota and South Dakota	182	142	132	85	123	102	178	151	136	232	214	178
Oklahoma, Kansas, etc.	412	425	417	373	420	400	326	397	383	293	315	336
Texas Inland	497	468	446	448	512	406	418	402	411	425	455	599
Texas Gulf	1,52	1,523	1,386	1,509	1,534	1,699	1,197	1,584	1,384	1,356	1,435	1,481
Louisiana Gulf Coast	1,542	1,523	1,386	1,509	1,534	1,699	1,658	1,758	1,821	1,855	1,563	1,227
Arkansas, Louisiana Inland, etc.	35	49	33	48	29	102	116	86	90	106	25	74
New Mexico	43	33	28	25	23	24	28	30	30	34	31	29
Rocky Mountain	157	160	164	176	150	166	137	155	150	132	140	160
West Coast	1,245	1,308	1,545	1,491	1,467	1,342	1,695	1,440	1,885	1,162	1,288	1,583
Total aviation gasoline	8,191	8,467	8,848	9,022	8,509	8,245	8,186	8,452	8,743	8,379	8,044	8,341

See footnote at end of table.

Table 49.—Stocks of gasoline in the United States in 1965, by districts and months—Continued

(Thousand barrels)

	January 31	February 28	March 31	April 30	May 31	June 30	July 31	August 31	September 30	October 31	November 30	December 31
Total motor and aviation stocks:[1]												
East Coast	50,801	50,134	49,709	49,282	49,952	47,631	45,907	45,658	45,325	47,575	45,981	45,982
Appalachian No. 1	5,786	5,866	6,145	5,964	5,665	5,276	5,436	4,950	5,021	5,022	4,779	4,681
Appalachian No. 2	3,519	3,355	3,458	3,140	3,099	3,015	3,036	2,937	3,155	3,222	3,194	3,087
Indiana, Illinois, Kentucky, etc.	37,054	39,850	40,876	38,810	35,323	31,803	30,066	28,857	29,522	28,591	28,407	29,325
Minnesota, Wisconsin, North Dakota and South Dakota	8,204	8,170	8,173	7,540	7,539	6,370	7,042	6,992	7,327	6,230	7,022	7,475
Oklahoma, Kansas, etc.	20,491	21,381	22,137	21,264	19,344	16,634	16,162	16,617	16,614	15,217	15,442	16,190
Texas Inland	9,206	9,443	9,093	8,947	8,577	7,307	6,726	6,528	6,657	7,154	7,369	7,994
Texas Gulf	27,107	29,560	28,384	26,084	22,026	22,372	20,899	21,142	20,768	18,884	20,985	22,925
Louisiana Gulf Coast	11,259	13,909	13,400	13,324	12,037	12,644	12,586	12,171	11,252	12,388	12,787	11,649
Arkansas, Louisiana Inland, etc.	8,831	8,927	9,447	9,294	9,119	8,477	8,518	8,607	7,705	6,272	5,822	5,778
New Mexico	779	950	959	900	858	747	785	818	804	903	868	791
Rocky Mountain	7,250	8,000	8,027	7,527	6,929	6,269	5,056	4,552	4,468	4,824	4,751	5,842
West Coast	23,688	25,498	25,103	25,277	25,143	24,018	22,878	21,961	21,662	20,876	21,895	21,389
Total: 1965	218,925	225,048	224,911	217,353	205,611	192,563	185,087	181,790	180,270	176,608	179,247	183,058
1964	198,115	209,513	215,108	209,419	205,917	193,541	185,845	185,814	188,017	181,614	191,444	193,638

[1] Includes stocks of gasoline at refineries, bulk terminals, and pipelines.

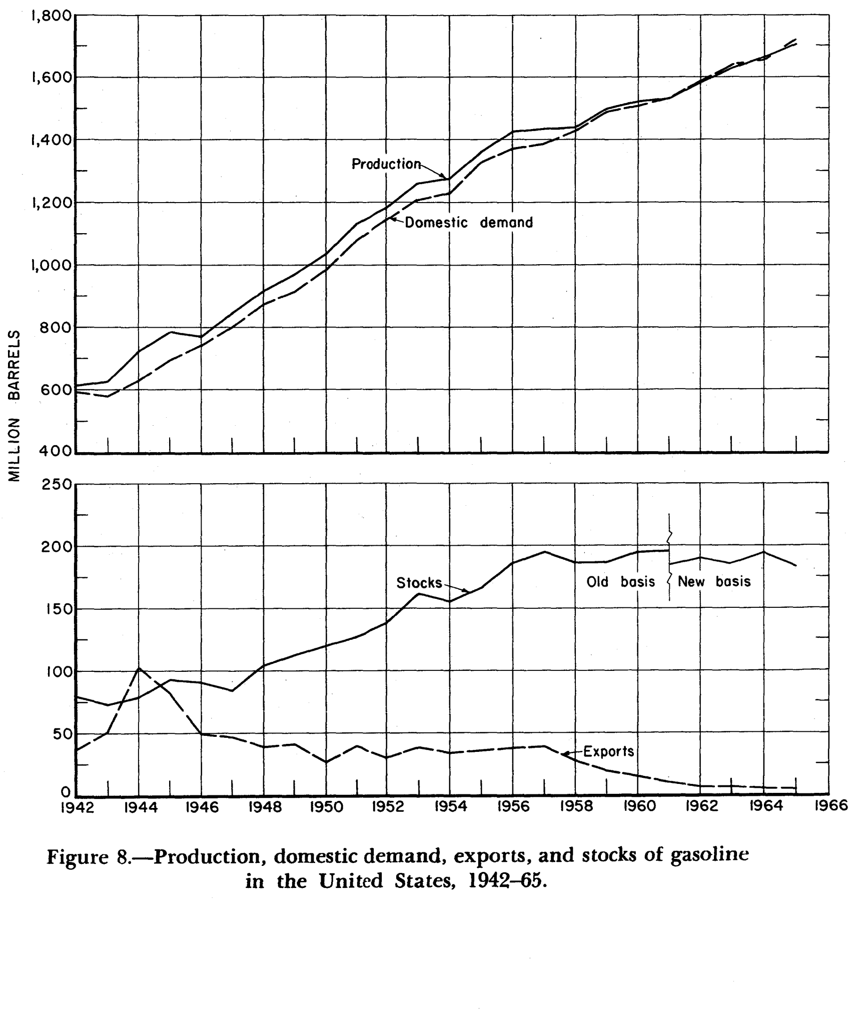

Figure 8.—Production, domestic demand, exports, and stocks of gasoline in the United States, 1942–65.

Table 50.—Shipments of aviation fuels in 1964 and 1965

(Thousand barrels)

	Shipments to PAD district:					United States total
	I	II	III	IV	V	
1964:						
Aviation gasoline:						
For commercial use, total	7,343	6,344	3,053	865	3,264	20,869
Airlines	5,580	4,100	1,666	647	1,626	13,619
Factory	101	145	25	—	89	360
General aviation	1,662	2,099	1,362	218	1,549	6,890
For military use	6,486	2,830	4,876	744	8,099	23,035
Jet fuel:						
For commercial use, total	35,630	18,877	8,089	2,929	25,568	91,093
Airlines	34,007	18,178	7,845	2,752	24,416	87,198
Factory	1,066	301	85	3	207	1,662
General aviation	557	398	159	174	945	2,233
For military use, total[1]	19,140	23,921	18,958	3,556	30,975	96,550
JP-4	14,418	23,167	16,785	3,553	25,506	83,429
JP-5	3,359	48	2,078	—	5,077	10,562
Other	1,363	706	95	3	392	2,559
1965:						
Aviation gasoline:						
General aviation	1,873	2,048	1,501	287	1,531	7,240
For commercial use, total	7,124	6,018	2,791	769	2,741	19,443
Airlines	5,188	3,904	1,235	474	1,173	11,974
Factory	63	66	55	8	37	229
For military use	4,781	2,407	7,405	689	6,657	21,939
Jet fuel:						
For commercial use, total	41,893	22,440	9,892	3,568	31,587	109,380
Airlines	39,850	21,034	8,264	3,322	30,515	102,985
Factory	1,196	412	74	30	331	2,043
General aviation	847	994	1,554	216	741	4,352
For military use, total[2]	22,172	23,285	18,478	2,968	32,063	98,966
JP-4	17,657	23,007	15,067	2,966	26,060	84,757
JP-5	4,310	162	3,358	—	5,498	13,328
Other	205	116	53	2	505	881

[1] Does not include 10,804,000 barrels imported directly by the military in PAD. district I and 1,314,000 barrels in PAD district V.

[2] Does not include 11,973,000 barrels imported directly by the military in PAD district I, and 2,160,000 barrels in PAD district V.

Definitions of terms used in this table:

1. Aviation gasoline: Any fuel in the gasoline boiling range for use in a piston-type aviation engine.
2. Jet fuel: Any fuel for use in an aviation turbine engine.
3. Airline: Sales to U. S. certificated air carriers, including air freight carriers, international air carriers (if delivery is made in the United States), and to such other air carriers as supplemental or nonschedule carriers, air taxi, etc.
4. Factory: Direct sales to airframe and engine manufacturers.
5. General Aviation: Primarily sales to distributors and airport dealers.
6. Military: Sales to Defense Fuel Supply Center and to other military agencies of the Government.

on occasion, use the other type. This is why the data is now reported by type. Attempts to compile data for previous years to compare them with 1965 have been unsuccessful.

Military purchases of jet fuel from domestic sources averaged 285,000 barrels daily in 1965 compared with 283,000 barrels daily in 1964.

The new supply of jet fuel in 1965 was comprised of 524,000 barrels daily produced at refineries and imports of 82,000 daily. Half of the jet fuel imports in 1965 were bonded fuels for use in aircraft destined for foreign ports. These imports are duty free and are not subject to the import quota regulations of the Oil Imports Administration.

For the distribution of jet fuel by PAD district and a breakdown by type of use, see table 50.

LUBRICANTS

While the domestic demand for lubricating oils increased 3.0 percent in 1965, exports declined 8.3 percent so total demand was less than in 1964. Lubricating oils and greases are the principal export product of the petroleum industry, and since more refineries abroad have installed facilities to produce these products, a decline in this market has been expected.

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Table 51.—Salient statistics of kerosine in the United States, by months and refinery districts

(Thousand barrels)

Month and district	1964							1965 p						
	Production at refineries	Yield (percent)	Production at natural gasoline plants	Imports	Exports	Stocks (end of period)	Domestic demand	Production at refineries	Yield (percent)	Production at natural gasoline plants	Imports	Exports	Stocks (end of period)	Domestic demand
Month:														
January	11,299	4.1	212	------	5	22,023	14,745	9,543	3.4	122	------	8	24,029	12,953
February	9,112	3.5	116	------	25	19,688	11,538	8,516	3.3	166	------	11	20,744	11,956
March	8,095	3.0	99	------	10	19,614	8,258	8,299	3.0	141	------	8	18,127	11,049
April	6,398	2.5	74	------	12	20,223	5,851	6,825	2.6	91	------	22	18,693	6,328
May	5,699	2.1	151	------	22	21,695	4,356	6,515	2.4	121	------	31	20,995	4,303
June	5,392	2.0	147	------	6	24,005	3,223	6,983	2.5	52	------	55	23,448	4,527
July	6,067	2.1	107	4	23	25,588	4,572	6,665	2.3	76	------	14	25,304	4,871
August	6,760	2.4	66	------	9	27,202	5,203	6,514	2.2	95	7	22	25,993	5,905
September	7,546	2.8	98	------	11	28,440	6,395	6,787	2.5	108	------	15	26,899	5,974
October	8,378	3.1	78	------	10	29,034	7,852	8,002	2.9	80	------	16	27,290	7,675
November	8,128	3.1	107	------	20	29,780	7,469	8,281	3.0	98	28	10	26,252	9,885
December	10,600	3.8	238	------	17	27,325	13,276	10,269	3.5	156	65	7	24,080	12,655
Total	93,474	2.9	1,493	4	170	27,325	92,738	93,149	2.8	1,306	100	219	24,080	97,581
District:														
East Coast	NA	NA	----			NA	NA	9,106	2.1	----			10,151	NA
Appalachian No. 1			----	4	72			1,150	2.8	----	92	54	693	
Appalachian No. 2			----					745	2.0	----			363	
Indiana, Illinois, Kentucky, etc.			----	----	3			17,731	3.0	----	----	9	4,880	
Minnesota, Wisconsin, etc.			----					2,022	3.6	----			1,105	
Oklahoma, Kansas, etc.			----					3,262	1.2	----			989	
Texas Inland			320					1,526	1.3	288			233	
Texas Gulf Coast			92					39,668	5.2	72			2,506	
Louisiana Gulf Coast			358	----	68			12,899	3.9	449	7	106	1,517	
Arkansas, Louisiana Inland, etc.			698					1,896	4.0	466			1,076	
New Mexico			25					189	1.6	31			56	
Rocky Mountain			----	----	----			2,509	2.1	----	----	----	298	
West Coast			----	----	27			446	0.1	----	1	50	213	
Total	93,474	2.9	1,493	4	170	27,325	92,738	93,149	2.8	1,306	100	219	24,080	97,581

p Preliminary. NA Not available.

Table 52.—Consumption of kerosine in the United States, by PAD districts, States, and uses [1]

(Thousand barrels)

District and State	Range oil		Tractor fuel		All other uses		Total	
	1964	1965	1964	1965	1964	1965	1964	1965
District 1:								
Connecticut	1,100	1,189	------	------	93	120	1,193	1,309
Delaware	584	692	------	------	104	134	688	826
District of Columbia	69	87	------	------	13	17	82	104
Florida	3,274	3,210	69	72	907	1,170	4,250	4,452
Georgia	733	730	83	87	373	481	1,189	1,298
Maine	1,866	1,798	3	3	195	252	2,064	2,053
Maryland	2,257	2,273	7	7	72	93	2,336	2,373
Massachusetts	3,500	2,994	------	6	386	498	3,886	3,498
New Hampshire	676	737	------	------	17	22	693	759
New Jersey	1,507	1,708	7	7	296	382	1,810	2,097
New York	4,513	4,830	16	17	605	780	5,134	5,627
North Carolina	10,356	10,976	58	61	1,309	1,689	11,723	12,726
Pennsylvania	2,934	3,130	17	18	547	706	3,498	3,854
Rhode Island	422	604	------	------	48	62	470	666
South Carolina	3,012	2,795	10	11	382	493	3,404	3,299
Vermont	540	746	7	7	------	8	547	761
Virginia	4,667	5,057	35	37	352	454	5,054	5,548
West Virginia	142	203	------	2	37	48	179	253
Total	42,152	43,759	312	335	5,736	7,409	48,200	51,503
District 2:								
Illinois	3,989	4,384	20	27	1,033	930	5,042	5,341
Indiana	2,898	2,813	5	7	696	626	3,599	3,446
Iowa	1,903	1,382	12	16	140	126	2,055	1,524
Kansas	225	1,677	13	18	132	119	370	1,814
Kentucky	1,012	2,231	------	------	162	146	1,174	2,377
Michigan	4,470	4,679	40	55	1,278	1,150	5,788	5,884
Minnesota	2,093	2,071	15	21	248	223	2,356	2,315
Missouri	888	1,037	25	34	102	92	1,015	1,163
Nebraska	322	645	15	21	139	125	476	791
North Dakota	873	40	------	------	13	12	886	52
Ohio	2,123	5,479	15	21	924	832	3,062	6,332
Oklahoma	212	850	5	7	99	89	316	946
South Dakota	881	524	15	21	20	18	916	563
Tennessee	1,040	1,426	3	4	1,235	1,112	2,278	2,542
Wisconsin	2,020	1,169	3	4	86	77	2,109	1,250
Total	24,949	30,407	186	256	6,307	5,677	31,442	36,340
District 3:								
Alabama	386	619	104	71	230	219	720	909
Arkansas	179	214	80	54	124	118	383	386
Louisiana	328	461	109	74	283	269	720	804
Mississippi	80	141	13	9	206	196	299	346
New Mexico	164	195	9	6	184	175	357	376
Texas	793	895	149	101	2,595	2,465	3,537	3,461
Total	1,930	2,525	464	315	3,622	3,442	6,016	6,282
District 4:								
Colorado	378	947	7	29	140	133	525	1,109
Idaho	363	500	4	11	18	10	385	521
Montana	629	227	------	------	22	21	651	248
Utah	493	403	8	33	40	38	541	474
Wyoming	126	179	4	17	10	10	140	206
Total	1,989	2,256	23	90	230	212	2,242	2,558
District 5:								
Alaska	8	10	------	------	------	------	8	10
Arizona	10	12	------	------	16	19	26	31
California	123	158	------	------	828	660	951	818
Hawaii	44	39	------	------	4	10	48	49
Nevada	1	1	------	------	6	4	7	5
Oregon	9	10	------	------	5	9	14	19
Washington	9	11	------	------	13	23	22	34
Total	204	241	------	------	872	725	1,076	966
Total United States	71,224	79,188	985	996	16,767	17,465	88,976	97,649

[1] Excludes kerosine type jet fuel.

Table 53.—Consumption of distillate fuel oil [1] in the United States, by uses

(Thousand barrels)

Use	1961	1962	1963	1964	1965
Heating oils	434,805	450,031	449,159	436,204	456,928
Range oil (No. 1 fuel oil)	15,487	16,799	16,156	15,656	19,064
Industrial (excluding oil company)	31,226	34,951	36,647	36,007	42,484
Oil company (excluding heating oil)	8,743	9,055	10,253	10,576	10,430
Gas and electric public utility powerplants	4,151	4,100	4,149	3,849	3,661
Railroads	85,180	86,803	88,117	88,198	86,436
Bunkering of vessels (including company tankers but excluding military)	14,566	15,836	15,148	16,001	15,532
Military (U.S. Army, Navy, Air Force, and Marine Corps)	11,484	13,041	13,436	13,609	14,953
Miscellaneous uses:					
Diesel fuel	77,825	89,729	106,341	117,534	124,122
Other light distillates	7,407	8,750	8,718	9,917	13,281
Total United States	690,874	729,095	748,124	747,551	786,891

[1] Includes diesel fuel.

LIQUEFIED GASES, ETHANE, AND ETHYLENE

Liquefied gases are derived from two sources. Those produced at refineries are called liquefied refinery gases to distinguish them from liquefied petroleum gases produced from natural gas. The liquefied petroleum gases (LPG) are all saturated (propane, butane, etc.). The liquefied refinery gases (LRG) may contain unsaturated compounds or olefines (propylene, butylene, etc.). The olefins are used as feedstock for chemical plants. The saturated gases may be used as chemical raw materials or as fuel. Beginning with 1963, separate data have been collected on liquefied refinery gas used as fuel and that used as raw material for petrochemical feedstocks. Liquefied gases are also used in producing gasoline and are reported in this chapter as natural gas liquids used at refineries or as gasoline. Although ethane and ethylene are not defined as liquefied gases, the statistics on these products are in some cases reported with those of LPG and LRG.

The total demand for liquefied gases in 1965, exclusive of that blended into other products at refineries or terminals, was 314,634,000 barrels. This includes a domestic demand of 307,114,000 barrels which comprises 256,634,000 barrels used as fuel and 50,480,000 barrels for chemical manufacturing. Petroleum refineries produced 106,836,000 barrels of liquefied gases in 1965 or about 34 percent of the demand requirements. Natural gas liquids produced at processing plants in 1965 totaled 268,030,000 barrels of which 67,102,000 barrels was delivered to refineries for blending into other products.

More detailed information on liquefied gases may be found in the chapter on natural gas liquids.

ASPHALT AND ROAD OIL

Asphalt production at petroleum refineries increased 7.6 percent in 1965 to 22,473,000 short tons, and imports were 1,145,000 short tons so that the new supply for the year (23,618,000 short tons) exceeded demand by 353,000 short tons. Shipments of asphalt and asphaltic base products in 1965 were 25,184,000 short tons compared with 24,046,000 short tons in 1964.

The demand for road oil in 1965 was 6,560,000 barrels, 15,000 barrels more than in 1964. Production for the year was 6,565,000 barrels.

OTHER PRODUCTS

Special naphthas.—Statistics on special naphthas were formerly reported in conjunction with gasolines. Since the uses for special naphthas are not in the fuel category, these special naphthas are now treated separately and include naphthas used for paint thinners, cleaning agents, and solvents. The total demand for this product in 1965 was 31,391,000 barrels, 6.8 percent more than in 1964.

Waxes.—The total demand for wax in 1965 increased 2.9 percent to 5,485,000 barrels although exports declined 4.9 percent. The increase in the demand for wax all occurred in the fully refined type of wax which represents 56 percent of the total wax production.

Table 54.—Salient statistics of distillate fuel oil in the United States, by months and refinery districts
(Thousand barrels unless otherwise stated)

Month and district	1964 Production at refineries	1964 Yield (percent)	1964 Production at natural gasoline plants	1964 Crude used directly as distillate[1]	1964 Imports	1964 Exports	1964 Stocks (end of period)	1964 Domestic demand	1965[p] Production at refineries	1965[p] Yield (percent)	1965[p] Production at natural gasoline plants	1965[p] Crude used directly as distillate[1]	1965[p] Imports	1965[p] Exports	1965[p] Stocks (end of period)	1965[p] Domestic demand
Month:																
January	67,443	24.3	40	68	1,594	1,211	128,534	96,077	66,765	23.6	33	65	1,094	370	130,619	92,814
February	62,812	24.3	32	60	1,069	419	110,527	81,561	60,930	23.8	30	65	815	245	105,282	86,932
March	61,681	22.8	38	87	875	604	99,195	73,409	62,188	22.6	41	89	1,439	552	84,571	83,916
April	57,525	22.4	33	61	787	303	97,758	59,540	58,544	22.4	32	63	827	246	82,754	61,037
May	60,775	22.6	31	53	723	317	112,185	46,838	61,453	22.4	27	56	1,239	311	99,394	45,824
June	61,092	22.5	33	62	1,035	271	130,272	43,864	58,692	21.4	23	61	470	235	116,559	41,846
July	64,184	22.3	37	63	627	403	153,462	41,138	65,497	22.4	35	61	938	272	138,535	44,283
August	61,986	21.8	33	62	856	199	175,033	41,347	66,370	22.7	33	66	1,591	278	158,377	47,940
September	59,347	22.0	29	58	912	538	186,726	48,115	62,744	22.9	28	63	1,061	478	171,973	49,822
October	59,552	21.6	28	58	840	515	189,364	57,325	65,652	23.4	27	63	1,340	119	181,988	56,948
November	58,881	22.2	28	62	574	245	182,579	66,085	66,112	23.7	26	59	1,063	286	177,278	71,684
December	66,768	23.6	31	61	1,893	361	155,846	95,125	70,124	24.0	24	62	1,143	281	155,407	92,943
Total	742,046	22.8	393	755	11,785	5,386	155,846	750,424	765,071	23.0	359	773	13,020	3,673	155,407	775,989
District:																
East Coast	120,997	26.9	------				64,470		115,748	26.4	------				59,781	
Appalachian No. 1	9,429	23.6	------	------	10,559	145	3,823		9,787	23.7	------	------	11,130	41	3,632	
Appalachian No. 2	7,001	18.6	------				1,730		7,482	19.7	------				1,609	
Indiana, Illinois, Kentucky, etc.	115,956	20.1	------				22,792		126,421	21.3	------				23,233	
Minnesota, Wisconsin, etc.	12,873	23.9	------	462	64	215	7,368		13,313	23.9	------	481	17	116	7,931	
Oklahoma, Kansas, etc.	65,070	23.9	------				12,232		68,315	24.6	1				11,799	
Texas Inland	19,319	16.5	172				2,513	NA	18,830	16.0	168				1,890	NA
Texas Gulf Coast	200,801	26.7	42				15,578		207,274	27.5	23				15,997	
Louisiana Gulf Coast	74,555	24.1	------	216	1,119	150	6,396		82,164	25.0	------	216	1,740	570	6,701	
Arkansas, Louisiana Inland, etc.	10,386	22.5	179				2,619		10,575	22.4	167				4,220	
New Mexico	1,712	15.8	------				179		2,006	17.4	------				270	
Rocky Mountain	25,833	22.2	------	77	------	30	2,455		26,906	22.4	------	76	------	14	2,906	
West Coast	78,114	16.2	------	------	43	4,846	13,691		76,250	15.1	------	------	133	2,932	15,438	
Total	742,046	22.8	393	755	11,785	5,386	155,846	750.424	765,071	23.0	359	773	13,020	3,673	155,407	775,989

[p] Preliminary. NA Not available.
[1] Figures represent crude oil used as fuel by pipelines, which is considered part of the demand for distillate.

Table 55.—Consumption of distillate fuel oil [1] in the United States by PAD districts and States

(Thousand barrels)

District and State	1961	1962	1963	1964	1965
District 1:					
Connecticut	23,199	23,099	22,906	20,378	21,415
Delaware	2,537	3,097	3,474	3,257	3,361
District of Columbia	2,726	2,878	2,872	2,957	3,566
Florida	9,369	10,611	10,902	11,076	12,456
Georgia	5,269	6,218	6,969	6,977	8,666
Maine	8,307	8,645	9,487	8,792	9,424
Maryland	14,257	15,146	16,014	16,863	17,361
Massachusetts	52,266	53,448	51,664	49,966	56,694
New Hampshire	5,486	5,834	6,327	5,742	5,907
New Jersey	46,992	48,622	51,466	51,655	54,123
New York	86,029	94,501	95,856	94,610	104,690
North Carolina	13,366	15,617	16,000	16,249	17,428
Pennsylvania	45,982	49,315	51,702	50,699	54,818
Rhode Island	7,547	7,411	7,391	6,272	7,017
South Carolina	5,116	5,776	6,169	5,228	4,910
Vermont	3,299	3,602	3,787	3,603	4,318
Virginia	14,631	15,843	16,945	16,542	18,941
West Virginia	2,525	2,490	2,622	2,320	2,882
Total	348,903	372,153	382,553	373,186	407,977
District 2:					
Illinois	42,255	41,361	41,421	41,580	41,702
Indiana	25,452	25,743	25,934	25,813	26,340
Iowa	10,043	11,022	11,106	10,968	11,256
Kansas	5,187	5,242	5,612	5,487	5,405
Kentucky	4,426	5,822	5,532	5,697	5,659
Michigan	30,547	31,131	30,471	29,576	31,079
Minnesota	15,967	16,776	16,629	16,739	19,227
Missouri	12,858	13,412	13,939	13,884	14,077
Nebraska	4,481	4,099	4,387	4,689	3,789
North Dakota	3,693	4,472	4,584	4,529	5,252
Ohio	23,433	24,250	26,348	27,121	28,132
Oklahoma	3,152	3,243	3,729	3,325	2,950
South Dakota	3,085	3,212	3,370	3,823	3,838
Tennessee	5,552	6,167	6,706	6,784	7,414
Wisconsin	22,153	23,399	23,461	23,328	23,902
Total	212,284	219,351	223,229	223,343	230,022
District 3:					
Alabama	4,310	4,938	5,148	5,887	5,335
Arkansas	3,078	2,451	2,579	3,358	2,899
Louisiana	9,038	9,622	9,762	9,688	8,517
Mississippi	1,954	2,715	2,885	3,322	2,841
New Mexico	2,841	3,512	3,642	3,946	3,971
Texas	21,795	23,959	24,092	23,998	25,280
Total	43,016	47,197	48,108	50,199	48,843
District 4:					
Colorado	4,441	4,148	4,580	4,074	4,002
Idaho	4,037	4,204	4,108	4,501	4,880
Montana	5,248	5,522	5,400	5,684	5,041
Utah	3,085	3,607	3,640	3,766	4,275
Wyoming	3,250	3,838	3,815	3,653	3,743
Total	20,061	21,319	21,544	21,678	21,941
District 5:					
Alaska	2,849	2,897	3,076	3,482	3,733
Arizona	3,107	3,001	3,520	3,528	3,584
California	27,410	29,685	32,256	34,991	35,672
Hawaii	1,666	1,641	1,375	1,769	1,613
Nevada	2,985	3,017	2,844	3,523	2,821
Oregon	11,061	11,777	12,828	13,855	13,295
Washington	17,532	17,057	16,791	17,997	17,390
Total	66,610	69,075	72,690	79,145	78,108
Total United States	690,874	729,095	748,124	747,551	786,891

[1] Includes diesel fuel oil.

Table 56.—Consumption of residual fuel oil [1] in the United States, by uses

(Thousand barrels)

Use	1961	1962	1963	1964	1965
Heating oils	121,097	125,164	125,248	126,215	156,254
Industrial (excluding oil company fuel)	153,766	156,221	149,269	157,176	140,602
Oil-company use (excluding heating oil)	44,399	45,978	46,976	43,098	34,354
Gas and electric public utility powerplants	87,881	88,261	91,615	97,595	114,884
Railroads	5,347	5,501	5,342	5,350	4,001
Bunkering of vessels (including company tankers but excluding military)	87,308	84,415	76,502	83,024	73,639
Military use (U.S. Army, Navy, Air Force, and Marine Corps)	36,762	35,667	36,444	35,568	40,380
Miscellaneous uses	6,426	7,226	7,126	8,606	10,004
Total United States	542,986	548,433	538,522	556,632	574,118

[1] Includes Navy grade and crude oil burned as fuel.

Petroleum Coke.—Coke production in 1965 was 17.2 million tons including 7.2 million tons of marketable coke, the balance was catalyst coke burned off the catalytic cracking units and utilized as refinery fuel. The demand for coke continued to increase, especially for the low-sulphur-content coke which is used in making electrodes required in the electrolytic production of aluminum. Refineries used 10.9 million tons of coke as refinery fuel in 1965 including 9.9 million tons of catalyst coke and 1.0 million barrels of marketable coke.

Still gas.—The production of still gas in 1965 was 851,539 million cubic feet (135,295,000 barrels). This does not include 8,926,000 barrels used for petrochemical feedstocks. Refiners used 848,072 million cubic feet as refinery fuel. The heating value of the gas was 993 Btu (British thermal units) per cubic foot in 1965 compared with 946 Btu in 1964.

Petrochemical Feedstocks.—The petrochemical industry's demand for feedstocks continued to increase; however, the share supplied by petroleum refineries from products other than LRG was less than in 1964. In 1965 this demand totaled 56,827,000 barrels, including exports of 1,951,000 barrels. In 1964, the demand was 57,599,000 barrels. Exports of petrochemical feedstocks for previous years were included with various other petroleum products. The 500,000 barrels of feedstocks imported in 1965 were from refineries in Puerto Rico.

Miscellaneous Oils.—The total demand for miscellaneous finished oils in 1965 increased 2.0 percent to 16,917,000 barrels; however, domestic demand declined 2.4 percent. Exports increased from 236,000 barrels in 1964 to 960,000 barrels in 1965. Finished petrochemical products accounted for 43 percent of the total production of miscellaneous oils in 1965 and was the only segment of products included in this group which increased for the year.

Unfinished Oils.—Unfinished oils include all oils that will be cracked or further distilled at refineries. The rerun (net) of unfinished oils represents imports plus or minus the change in stocks.

Imports of unfinished oils are included with crude oil under the quota established by the Oil Import Administration. By regulation, imports of unfinished oils are restricted to 10 percent of the crude oil and unfinished oils quota.

Table 57.—Salient statistics of residual fuel oil in the United States, by months and refinery districts

(Thousand barrels unless otherwise stated)

Month and district	1964							1965 p						
	Production	Yield (Percent)	Crude used directly as residual [1]	Exports	Imports	Stocks (end of period)	Domestic demand	Production	Yield (Percent)	Crude used directly as residual [1]	Imports	Exports	Stocks (end of period)	Domestic demand
Month:														
January	25,826	9.3	246	39,721	1,561	45,352	66,418	25,300	9.0	640	38,726	1,473	38,285	65,311
February	22,747	8.8	372	29,187	1,023	43,262	53,373	22,396	8.7	496	34,225	1,658	35,711	58,033
March	22,298	8.3	236	24,712	1,668	39,100	49,740	24,657	9.0	258	34,738	1,640	34,362	59,362
April	21,231	8.3	363	27,863	2,000	38,477	48,080	22,009	8.4	273	34,071	1,367	34,476	54,872
May	20,821	7.7	285	19,797	1,375	40,459	37,546	21,266	7.8	244	24,615	926	40,062	39,613
June	19,519	7.2	276	17,748	1,942	40,356	35,704	20,923	7.6	291	23,640	1,043	45,246	38,627
July	21,556	7.5	270	20,460	1,498	42,977	38,167	21,635	7.4	302	22,126	1,275	50,209	37,825
August	21,114	7.4	313	18,447	1,547	44,644	36,660	21,112	7.2	232	20,400	1,330	53,850	36,773
September	21,280	7.9	365	18,915	1,517	45,364	38,323	19,464	7.1	358	19,963	993	53,138	37,504
October	22,001	8.0	261	24,712	1,879	45,936	44,523	22,365	8.0	267	27,476	1,141	58,350	45,755
November	23,326	8.8	286	23,342	1,321	46,135	45,434	22,847	8.2	293	26,093	1,014	59,736	46,833
December	25,106	8.9	447	30,867	1,539	40,403	60,613	24,593	8.4	296	38,532	1,018	56,214	65,925
Total	266,825	8.2	3,720	295,771	18,870	40,403	554,581	268,567	8.0	3,950	344,605	14,878	56,214	586,433
District:														
East Coast	35,934	8.0	35	274,306	66	459		32,069	7.3	22	318,559	197	11,665	
Appalachian No. 1	3,864	9.7				10,213		3,713	9.0				398	
Appalachian No. 2	3,569	9.5				137		3,166	8.3				112	
Indiana, Illinois, Kentucky, etc.	48,567	8.4	587	804	226	6,726		48,391	8.1	576	1,188	67	7,649	
Minnesota, Wisconsin, etc.	6,257	11.6				502		6,749	12.1				703	
Oklahoma, Kansas, etc.	4,532	1.7				851		3,519	1.3				1,094	
Texas Inland	4,342	3.7				2,350	NA	4,109	3.5				2,312	NA
Texas Gulf Coast	32,249	4.2				2,928		35,481	4.7				4,750	
Louisiana Gulf Coast	17,540	5.5				1,306		14,072	4.3				1,894	
Arkansas, Louisiana Inland, etc.	2,280	5.0	1,794	11,204	3,068	80		2,748	5.8	1,772	14,598	2,290	190	
New Mexico	423	3.9				19		360	3.1				17	
Rocky Mountain	12,947	11.1	273	45	1	821		11,593	9.6	258	43	9	1,061	
West Coast	94,321	19.6	1,031	9,412	15,509	14,011		102,597	20.3	1,322	10,217	12,315	24,369	
Total	266,825	8.2	3,720	295,771	18,870	40,403	554,581	268,567	8.0	3,950	344,605	14,878	56,214	586,433

p Preliminary. NA Not available.

[1] Represents crude oil used as fuel on leases and for general industrial purposes.

Table 58.—Consumption of residual fuel oil [1] in the United States, by PAD districts and States

(Thousand barrels)

District and State	1961	1962	1963	1964	1965
District 1:					
Connecticut	14,549	16,019	16,260	19,848	16,776
Delaware	4,986	4,775	4,707	4,473	5,317
District of Columbia	1,955	2,243	2,533	3,914	6,504
Florida	32,600	37,044	36,668	39,425	43,093
Georgia	5,048	5,285	5,663	7,049	8,106
Maine	6,366	5,985	5,332	7,546	6,442
Maryland	12,955	13,751	13,270	14,444	15,140
Massachusetts	40,242	41,852	37,693	43,320	53,294
New Hampshire	2,067	2,545	2,524	2,588	2,408
New Jersey	42,990	50,422	50,539	50,135	42,445
New York	83,518	89,667	88,606	84,596	102,974
North Carolina	4,738	3,725	3,318	3,781	4,583
Pennsylvania	38,970	41,422	42,245	43,636	42,430
Rhode Island	7,543	8,274	8,177	8,218	6,186
South Carolina	5,031	5,908	5,833	5,050	3,762
Vermont	540	629	607	413	937
Virginia	14,195	13,225	14,055	15,516	16,179
West Virginia	1,216	1,480	1,572	2,297	2,087
Total	319,509	344,251	339,602	356,249	378,663
District 2:					
Illinois	25,750	24,756	25,582	21,411	22,220
Indiana	11,988	10,736	10,756	11,464	12,601
Iowa	1,032	873	931	1,034	513
Kansas	1,433	1,533	1,565	1,127	1,052
Kentucky	278	389	460	559	576
Michigan	9,896	9,275	9,746	8,905	8,011
Minnesota	5,524	6,307	6,102	5,671	4,827
Missouri	2,638	2,131	2,335	2,400	3,252
Nebraska	419	626	1,133	958	310
North Dakota	552	524	553	678	834
Ohio	9,023	8,227	7,790	9,233	10,558
Oklahoma	873	967	797	825	795
South Dakota	36	152	245	106	48
Tennessee	171	105	275	287	276
Wisconsin	4,028	3,813	4,110	4,145	3,086
Total	73,641	70,414	72,380	68,803	68,959
District 3:					
Alabama	3,555	2,749	3,184	2,274	2,459
Arkansas	379	566	864	750	406
Louisiana	8,537	6,563	6,653	7,293	7,589
Mississippi	338	474	878	826	482
New Mexico	311	323	209	146	655
Texas	21,437	18,711	17,485	17,509	13,772
Total	34,557	29,386	29,273	28,798	25,363
District 4:					
Colorado	2,465	2,497	2,572	2,617	1,961
Idaho	422	223	260	433	344
Montana	2,533	3,049	2,836	2,356	1,195
Utah	5,654	6,048	5,790	5,502	5,500
Wyoming	2,555	3,288	2,490	2,241	2,105
Total	13,629	15,105	13,948	13,149	11,105
District 5:					
Alaska	641	715	742	800	863
Arizona	94	117	60	113	40
California	81,587	68,949	62,842	66,927	67,614
Hawaii	6,646	6,716	6,940	7,539	7,673
Nevada	258	165	180	133	83
Oregon	4,879	4,989	4,930	5,314	4,931
Washington	7,545	7,626	7,625	8,807	8,824
Total	101,650	89,277	83,319	89,633	90,028
Total United States	542,986	548,433	538,522	556,632	574,118

[1] Includes some crude oil burned as fuel.

Table 59.—Salient statistics of jet fuel in the United States, by months and districts
(Thousand barrels)

	1964 [1]					1965 p										
	Production [2]	Imports	Exports	Stocks, end of period	Domestic demand	Production			Imports		Exports		Stocks, end of period		Domestic demand	
						Naphtha type [2]	Kerosine type	Total	Naphtha type	Kerosine type	Naphtha type	Kerosine type	Naphtha type	Kerosine type	Naphtha type	Kerosine type
By months:																
January	13,562	2,623	36	17,350	16,183	6,065	8,808	14,873	1,920	850	------	21	7,528	10,172	8,825	9,841
February	13,363	1,597	13	17,822	14,475	6,019	7,712	13,731	1,258	787	------	12	7,992	10,679	6,813	7,980
March	15,251	2,013	14	18,722	16,350	7,084	8,952	16,036	784	968	------	13	8,467	10,757	7,393	9,829
April	14,862	1,486	14	17,998	17,058	6,652	9,102	15,754	1,806	901	------	123	8,659	11,351	8,266	9,286
May	15,302	2,027	11	18,171	17,145	7,478	9,418	16,896	1,735	1,210	------	92	8,451	11,578	9,421	10,309
June	15,904	2,275	11	17,420	18,919	6,702	8,964	15,666	1,845	1,325	------	119	8,551	11,958	8,447	9,790
July	16,496	2,439	12	18,337	18,006	7,010	9,816	16,826	874	1,386	------	28	8,673	12,327	7,762	10,805
August	16,921	2,615	9	19,541	18,323	7,365	8,674	16,039	1,395	1,424	------	36	8,111	11,709	9,322	10,680
September	15,175	1,663	12	18,417	17,950	7,056	8,934	15,990	484	1,270	------	13	7,151	10,765	8,500	11,135
October	15,552	1,663	9	17,913	17,710	7,221	9,275	16,496	1,001	1,019	------	10	7,559	10,691	7,814	10,358
November	15,502	1,690	13	17,747	17,345	6,806	9,423	16,229	1,716	1,037	------	71	7,508	11,082	8,573	9,998
December	14,650	1,152	16	18,744	14,789	7,071	9,561	16,632	1,675	1,292	------	49	8,338	10,361	7,916	11,525
Total	182,540	23,243	170	18,744	204,253	82,529	108,639	191,168	16,493	13,469	------	587	8,338	10,361	99,052	121,536
By districts:																
East Coast		18,585				2,301	5,837	8,138	12,926	9,704			571	1,896		
Appalachian No. 1						753	129	882					104	88		
Appalachian No. 2						76	1,202	1,278					51	130		
Indiana, Illinois, Kentucky, etc.						8,770	16,178	24,948					474	1,787		
Minnesota, Wisconsin, North and South Dakota		------				2,106	25	2,131	------	214			254	244		
Oklahoma, Kansas, Missouri, etc.	NA		19	NA	NA	6,961	8,052	15,013			------	38	816	659	NA	NA
Texas Inland						10,221	5,355	15,576					633	341		
Texas Gulf						15,777	20,375	36,152					1,420	1,136		
Louisiana Gulf Coast		------				9,878	20,373	30,251	------	51			1,064	465		
Arkansas, Louisiana Inland, etc.						1,408	80	1,488					421	227		
New Mexico						1,393	------	1,393					180	11		
Rocky Mountain		------				5,579	988	6,567	------	------			477	76		
West Coast		4,658	151			17,306	30,045	47,351	3,567	3,500	------	549	1,873	3,301		
Total	182,540	23,243	170	18,744	204,253	82,529	108,639	191,168	16,493	13,469	------	587	8,338	10,361	99,052	121,536

p Preliminary. NA Not available.
[1] Breakdown for naphtha and kerosine type not available for 1964.
[2] Includes naphtha-type jet fuel produced at natural gas liquid plants: Texas Gulf, 1964—114; 1965—0; Akransas, Louisiana Inland, etc., 1964—295; 1965—113.

Table 60.—Salient statistics of lubricants in the United States, by months and districts

(Thousand barrels unless otherwise stated)

Month and district	1964											
	Production				Yield (percent)	Imports (all types)	Exports (all types)	Stocks, end of period				Domestic demand (all types)
	Bright stock	Neutral	Other grades	Total				Bright stock	Neutral	Other grades	Total	
By months:												
January	667	1,760	2,723	5,150	1.9	4	1,200	1,809	4,082	8,400	14,291	3,984
February	519	1,705	2,604	4,828	1.9	2	1,440	1,803	4,038	8,489	14,330	3,351
March	548	2,019	2,640	5,207	1.9	3	1,365	1,760	4,172	8,467	14,399	3,776
April	535	2,063	2,687	5,285	2.1	4	1,983	1,571	3,633	8,114	13,318	4,387
May	492	1,896	3,009	5,397	2.0	2	1,284	1,887	3,400	8,551	13,838	3,595
June	586	1,961	2,703	5,250	1.9	5	1,630	1,787	3,237	8,118	13,142	4,321
July	467	2,052	2,838	5,357	1.9	4	1,647	1,629	3,103	8,153	12,885	3,971
August	729	1,744	2,942	5,415	1.9	2	1,691	1,529	3,214	8,146	12,889	3,722
September	517	2,103	2,664	5,284	2.0	3	1,242	1,554	3,523	7,929	13,006	3,928
October	525	2,123	2,783	5,431	2.0	5	1,660	1,497	3,556	7,990	13,043	3,739
November	586	2,158	2,603	5,347	2.0	1	1,483	1,596	3,747	7,980	13,323	3,585
December	569	2,077	3,071	5,717	2.0	2	1,551	1,609	3,967	8,486	14,062	3,429
Total	6,740	23,661	33,267	63,668	2.0	37	18,176	1,609	3,967	8,486	14,062	45,788
By districts:												
East Coast	936	2,525	4,614	8,075	1.8	31		226	510	2,339	3,075	
Appalachian No. 1	1,041	1,430	739	3,210	8.1			220	264	278	762	
Appalachian No. 2	1	130	268	399	1.1			3	36	97	136	
Indiana, Illinois, Kentucky, etc.	1,068	4,064	477	5,609	.9			82	632	1,109	1,823	
Minnesota, Wisconsin, etc.	------	------	------	------	----	3		------	------	35	35	
Oklahoma, Kansas, etc.	857	2,920	1,048	4,825	1.8		16,689	126	475	202	803	
Texas Inland	------	------	156	156	.1			------	------	37	37	NA
Texas Gulf Coast	1,872	5,462	18,598	25,932	3.5			281	1,039	2,752	4,072	
Louisiana Gulf Coast	703	5,530	1,203	7,436	2.4	------		60	773	284	1,117	
Arkansas, Louisiana Inland, etc.	------	67	1,945	2,012	4.3			21	3	339	363	
New Mexico	------	------	------	------	----			------	------	3	3	
Rocky Mountain	42	223	72	337	.3	1		11	31	42	84	
West Coast	220	1,310	4,147	5,677	1.2	2	1,487	579	204	969	1,752	
Total	6,740	23,661	33,267	63,668	2.0	37	18,176	1,609	3,967	8,486	14,062	45,788

By months:												
January	563	1,845	2,540	4,948	1.8	1	1,286	1,676	3,810	8,367	13,853	3,872
February	544	1,975	2,350	4,869	1.9	1	1,072	1,788	4,192	8,452	14,432	3,219
March	670	2,077	2,715	5,462	2.0	2	1,583	1,940	4,060	8,012	14,012	4,301
April	528	2,044	2,732	5,304	2.0	2	1,858	1,790	3,762	8,123	13,675	3,785
May	675	2,035	2,870	5,580	2.0	3	1,717	1,771	3,618	8,000	13,389	4,152
June	514	1,913	2,648	5,075	1.9	3	1,322	1,631	3,439	7,818	12,888	4,257
July	531	2,186	2,684	5,401	1.9	3	1,367	1,583	3,528	7,689	12,800	4,125
August	615	2,112	2,694	5,421	1.9	3	911	1,664	3,612	7,987	13,263	4,050
September	511	2,007	2,592	5,110	1.9	3	1,409	1,532	3,624	7,835	12,991	3,976
October	580	1,824	2,745	5,149	1.8	3	1,570	1,588	3,238	7,930	12,756	3,817
November	546	2,097	2,493	5,136	1.8	2	1,214	1,600	3,351	7,944	12,895	3,785
December	597	2,130	2,743	5,470	1.9	3	1,366	1,808	3,518	7,978	13,304	3,698
Total	6,874	24,245	31,806	62,925	1.9	29	16,675	1,808	3,518	7,978	13,304	47,037
By districts:												
East Coast	890	2,638	4,225	7,753	1.8	27		222	501	2,258	2,981	
Appalachian No. 1	1,119	1,601	756	3,476	8.4			192	223	338	753	
Appalachian No. 2	25	75	320	420	1.1			2	21	83	106	
Indiana, Illinois, Kentucky, etc.	730	4,536	463	5,729	1.0			102	443	1,204	1,749	
Minnesota, Wisconsin, etc.	------	------	------	------	----	-----		------	------	42	42	
Oklahoma, Kansas, etc.	493	3,181	1,460	5,134	1.8		15,662	118	652	213	983	
Texas Inland	17	------	156	173	.1			------	------	38	38	NA
Texas Gulf Coast	1,981	4,913	18,201	25,045	3.3			366	770	2,510	3,646	
Louisiana Gulf Coast	797	5,400	871	7,068	2.2	1		159	620	246	1,025	
Arkansas, Louisiana Inland	377	115	1,500	1,992	4.2			------	9	234	243	
New Mexico	------	------	------	------	----			------	------	4	4	
Rocky Mountain	37	263	148	448	.4	-----		9	55	42	106	
West Coast	458	1,523	3,706	5,687	1.1	1	1,013	638	224	766	1,628	
Total	6,874	24,245	31,806	62,925	1.9	29	16,675	1,808	3,518	7,978	13,304	47,037

NA Not available.

Table 61.—Salient statistics of liquefied gases and ethane in the United States, by months and districts

(Thousand barrels unless otherwise stated)

Month and district	1964 Refinery production	1964 Yield (percent)	1964 Transfers from gasoline plants	1964 Imports	1964 Exports	1964 Stocks, end of period	1964 Domestic demand	1965 p Refinery production	1965 p Yield (percent)	1965 p Transfers from gasoline plants	1965 p Imports	1965 p Exports	1965 p Stocks, end of period	1965 p Domestic demand
By months:														
January	8,874	3.2	22,382	420	404	3,272	31,886	8,807	3.1	20,556	620	487	3,452	29,736
February	8,436	3.3	17,390	447	386	3,038	26,121	8,677	3.4	19,222	614	462	3,394	28,109
March	9,417	3.5	15,303	321	433	3,355	24,291	9,500	3.5	20,104	686	761	3,033	29,890
April	9,046	3.5	12,573	246	410	3,523	21,287	8,878	3.4	14,520	408	479	3,360	23,000
May	8,959	3.3	11,739	185	437	3,871	20,098	9,346	3.4	13,014	369	573	4,153	21,363
June	9,129	3.4	11,572	232	498	4,291	20,015	9,049	3.3	12,785	497	677	4,496	21,311
July	9,273	3.2	13,054	352	475	4,578	21,917	9,228	3.2	12,308	481	543	4,612	21,358
August	8,830	3.1	14,188	266	485	4,701	22,676	8,962	3.1	13,096	623	685	4,580	22,028
September	8,507	3.1	14,331	298	413	4,569	22,855	8,552	3.1	14,650	670	674	4,538	23,240
October	8,912	3.2	16,592	416	426	4,951	25,112	8,412	3.0	17,465	665	555	4,383	26,142
November	8,192	3.1	17,330	410	462	4,650	25,771	8,226	3.0	19,575	843	869	4,307	27,851
December	8,937	3.2	23,165	535	529	3,692	33,066	9,199	3.1	22,923	1,077	755	3,665	33,086
Total	106,512	3.3	189,619	4,128	5,358	3,692	295,095	106,836	3.2	200,218	7,553	7,520	3,665	307,114
By districts:														
East Coast	12,260	2.7		308		458		12,591	3.0				256	
Appalachian No. 1	726	1.8				9		762	1.8		182		9	
Appalachian No. 2	453	1.2				2		550	1.4				3	
Indiana, Illinois, Kentucky, etc.	13,476	2.3				624		11,027	1.9				380	
Minnesota, Wisconsin, North & South Dakota	1,154	2.1		2,509		16		986	1.8		4,146		25	
Oklahoma, Kansas, etc.	7,638	2.8	NA		4,430	352	NA	7,107	2.6			6,620	392	
Texas Inland	3,096	2.6				100		2,832	2.4	NA			109	NA
Texas Gulf Coast	40,340	5.4				910		43,466	5.7				1,128	
Louisiana Gulf Coast	11,384	3.6		------		313		12,692	3.9				397	
Arkansas, Louisiana Inland, etc.	1,878	4.1				10		1,030	2.2		------		15	
New Mexico	282	2.6				4		214	1.9				6	
Rocky Mountain	1,737	1.5		112		19		1,438	1.2		684		18	
West Coast	12,088	2.5		1,199	928	875		12,141	2.4		2,541	900	927	
Total	106,512	3.3	189,619	4,128	5,358	3,692	295,095	106,836	3.2	200,218	7,553	7,520	3,665	307,114

p Preliminary. NA Not available.

Table 62.—Statistical summary of petroleum asphalt and road oil

(Thousand short tons)[1]

	1961	1962	1963	1964	1965 [p]
Petroleum asphalt:					
Production	18,513	19,923	20,354	20,887	22,473
Imports (including natural)	1,201	1,204	1,130	1,075	1,145
Exports	121	150	128	139	71
Stocks (end of period)	2,363	2,591	2,610	2,588	2,941
Apparent domestic consumption	19,592	20,749	21,337	21,845	23,194
Petroleum asphalt shipments:					
Paving	15,318	16,322	16,947	17,367	18,307
Roofing	3,635	3,842	3,821	4,217	4,045
All other	1,755	1,932	1,879	2,462	2,832
Total	20,708	22,096	22,647	24,046	25,184
Road oil:					
Production	1,058	1,287	1,235	1,158	1,194
Stocks (end of period)	138	159	137	105	106
Apparent domestic consumption	1,055	1,266	1,257	1,190	1,193
Road oil shipments	1,083	1,109	1,099	1,208	1,189

[p] Preliminary.
[1] Converted from barrels to short tons (5.5 barrels = 1 short ton).

Table 63.—Salient statistics of petroleum asphalt in the United States, by months and districts

(Thousand short tons)[1]

Month and district	1964 Production	1964 Imports (including natural)	1964 Exports	1964 Stocks (end of period)	1964 Domestic demand	1965 p Production	1965 p Imports (including natural)	1965 p Exports	1965 p Stocks (end of period)	1965 p Domestic demand
Month:										
January	806	64	9	2,875	596	1,041	72	2	3,065	634
February	1,010	25	9	3,298	605	1,040	76	6	3,537	638
March	1,325	42	8	3,866	791	1,353	59	6	4,071	872
April	1,454	50	14	4,058	1,297	1,502	75	8	4,231	1,409
May	2,031	89	7	4,000	2,170	2,212	76	6	4,281	2,232
June	2,317	191	17	3,668	2,823	2,196	159	11	3,765	2,860
July	2,469	151	11	3,241	3,037	2,615	112	7	3,361	3,124
August	2,483	105	10	2,791	3,028	2,663	160	7	2,939	3,238
September	2,268	108	19	2,324	2,824	2.449	135	5	2,699	2,819
October	2,129	95	10	2,012	2,526	2,294	88	4	2,407	2,670
November	1,490	82	14	2,128	1,440	1,777	71	5	2,536	1,714
December	1,105	73	11	2,588	708	1,331	62	4	2,941	984
Total	20,887	1,075	139	2,588	21,845	22,473	1,145	71	2,941	23,194
District:										
East Coast	4,827	983		694		5,157	928		777	
Appalachian No. 1	299			47		243			55	
Appalachian No. 2	572			72		634			70	
Illinois, Indiana, Kentucky, etc.	3,989			399		4,312			475	
Minnesota, Wisconsin, North Dakota	326	27		24		326	26		55	
Oklahoma, Kansas, etc.	2,132		108	306	NA	2,301		38	331	NA
Texas Inland	1,005			94		1,066			111	
Texas Gulf Coast	1,406			86		1,428			115	
Louisiana Gulf Coast	859	65		146		1,406	191		180	
Arkansas, Louisiana Inland, etc.	1,017			138		1,060			120	
New Mexico	141			21		149			22	
Rocky Mountain	1,348	------		224		1,351	------		241	
West Coast	2,966	------	31	337		3,040	------	33	389	
Total	20,887	1,075	139	2,588	21,845	22,473	1,145	71	2,941	23,194

p Preliminary. NA Not Available.
[1] Converted from barrels to short tons (5.5 barrels = 1 short ton).

Table 64.—Salient statistics of road oil in the United States, by months and refinery districts

(Short tons)[1]

Month and district	1964 Production	1964 Stocks (end of period)	1964 Domestic demand	1965 p Production	1965 p Stocks (end of period)	1965 p Domestic demand
Month:						
January	28,181	154,364	10,727	46,545	141,636	10,182
February	34,182	176,727	11,818	45,273	182,364	4,545
March	98,727	260,364	15,091	61,454	218,182	25,636
April	81,273	308,364	33,273	65,091	250,000	33,273
May	93,091	289,273	112,182	115,818	266,727	99,091
June	172,364	273,818	187,818	173,273	238,182	201,818
July	233,091	220,000	286,909	220,545	196,909	261,818
August	174,364	198,909	195,455	210,182	150,909	256,182
September	93,273	155,636	136,545	105,273	108,909	147,273
October	59,636	96,182	119,091	92,000	102,909	98,000
November	60,364	97,818	58,727	26,909	87,818	42,000
December	29,818	105,273	22,364	31,273	106,182	12,909
Total	1,158,364	105,273	1,190,000	1,193,636	106,182	1,192,727
District:						
East Coast	3,635	------	NA	2,000	------	NA
Appalachian No. 1	--------	------		112,181	5,273	
Appalachian No. 2	1,818	------		--------	------	
Illinois, Indiana, Kentucky, etc.	342,182	8,909		371,637	6,363	
Minnesota, Wisconsin, North Dakota	27,273	------		28,728	------	
Oklahoma, Kansas, etc.	322,364	24,364		255,090	29,273	
Texas Inland	--------	------		--------	------	
Texas Gulf Coast	182	364		5,092	364	
Louisiana Gulf Coast	--------	------		--------	------	
Arkansas, Louisiana Inland, etc.	--------	------		--------	------	
New Mexico	364	------		--------	------	
Rocky Mountain	262,728	19,636		229,454	18,545	
West Coast	197,818	52,000		189,454	46,364	
Total	1,158,364	105,273	1,190,000	1,193,636	106,182	1,192,727

p Preliminary. NA Not available.
[1] Converted from barrels to short tons (5.5 barrels = 1 short ton).

Table 65.—Salient statistics of special naphthas in the United States, by months and refining districts

(Thousand barrels unless otherwise stated)

Month and district	1964 Production at refineries	1964 Yield (per cent)	1964 Production at natural gasoline plants	1964 Imports	1964 Exports	1964 Stocks (end of period)	1964 Domestic demand	1965 p Production at refineries	1965 p Yield (per cent)	1965 p Production at natural gasoline plants	1965 p Imports	1965 p Exports	1965 p Stocks (end of period)	1965 p Domestic demand
Month:														
January	1,929	0.7	18	437	130	5,122	2,104	2,294	0.8	19	125	68	5,888	2,361
February	2,245	.9	17	508	138	5,578	2,176	2,252	.9	12	274	65	5,794	2,567
March	1,938	.7	15	487	123	5,249	2,646	2,349	.9	13	473	109	5,719	2,801
April	2,394	.9	20	421	124	5,252	2,708	2,253	.9	7	290	214	5,535	2,520
May	2,363	.9	27	104	149	5,007	2,590	2,223	.8	11	235	155	5,444	2,405
June	2,092	.8	21	440	100	4,959	2,501	2,601	.9	10	319	164	5,263	2,947
July	2,488	.9	25	172	238	5,518	1,888	2,444	.8	18	255	193	6,162	1,625
August	2,293	.8	20	144	226	5,554	2,195	2,375	.8	7	286	109	5,793	2,928
September	1,826	.7	21	644	139	5,556	2,350	2,366	.9	9	414	150	5,743	2,689
October	2,112	.7	24	228	181	5,551	2,188	2,471	.9	7	3	112	5,835	2,277
November	2,089	.7	30	97	90	5,801	1,876	2,482	.9	5	3	121	5,999	2,205
December	2,109	.7	28	462	192	5,879	2,329	2,624	.9	5	187	99	6,209	2,507
Total	25,878	.8	266	4,144	1,830	5,879	27,551	28,734	.9	123	2,864	1,559	6,209	29,832
District:														
East Coast	1,511			3,633				1,428	.3		2,300	332	1,419	
Appalachian No. 1	438							449	1.1				94	
Appalachian No. 2	172							165	.4				17	
Indiana, Illinois, Kentucky, etc.	3,709			21				3,849	.6		27	462	1,007	
Minnesota, Wisconsin, etc.	------							------	----				122	
Oklahoma, Kansas, etc.	1,968							2,082	.8				298	
Texas Inland	371	NA	NA		NA	NA	NA	1,131	1.0	NA			97	NA
Texas Gulf Coast	12,661							14,861	2.0				1,912	
Louisiana Gulf Coast	657			435				433	.1		537	710	122	
Arkansas, Louisiana Inland, etc.	775							715	1.5				136	
New Mexico	------							------	----				1	
Rocky Mountain	163			------				525	.4		------	------	52	
West Coast	3,453			55				3,096	.6		------	55	932	
Total	25,878	.8	266	4,144	1,830	5,879	27,551	28,734	.9	123	2,864	1,559	6,209	29,832

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Table 66.—Salient statistics on wax in the United States, by types, months, and districts

(Thousand barrels)[1]

Month and district	1964										
	Production				Imports (all types)	Exports (all types)	Stocks, end of period				Domestic demand (all types)
	Micro-crystal-line	Fully refined	Other	Total			Micro-crystal-line	Fully refined	Other	Total	
By months:											
January	57	191	156	404	------	122	169	359	326	854	314
February	78	250	81	409	------	137	189	413	269	871	255
March	79	233	144	456	------	130	179	394	285	858	339
April	85	208	150	443	------	121	175	407	277	859	321
May	108	269	114	491	------	172	193	438	258	889	289
June	88	249	109	446	------	136	182	462	267	911	288
July	104	248	86	438	------	141	206	445	249	900	308
August	63	226	144	433	------	171	185	425	271	881	281
September	94	253	88	435	------	168	183	407	247	837	311
October	77	255	141	473	------	152	171	392	272	835	323
November	81	256	138	475	------	129	182	402	282	866	315
December	86	251	112	449	------	155	213	409	286	908	252
Total	1,000	2,889	1,463	5,352	------	1,734	213	409	286	908	3,596
By districts:											
East Coast	244	1,226	461	1,931	------		25	82	40	147	
Appalachian No. 1	159	43	243	445			39	35	19	93	
Appalachian No. 2	------	55	36	91			------	5	------	5	
Indiana, Illinois, Kentucky, etc.	14	197	147	358			2	15	80	97	
Minnesota, Wisconsin, etc.	------	------	------	------	------		------	------	------	------	
Oklahoma, Kansas, etc.	247	212	78	537		1,579	31	35	8	74	
Texas Inland	95	------	------	95			56	------	------	56	NA
Texas Gulf Coast	136	500	359	995			28	67	99	194	
Louisiana Gulf Coast	74	255	51	380	------		16	67	1	84	
Arkansas, Louisiana Inland, etc.	------	------	------	------			------	------	------	------	
New Mexico	------	------	------	------			------	------	------	------	
Rocky Mountain	31	44	17	92	------		16	8	39	63	
West Coast	------	357	71	428	------	155	------	95	------	95	
Total	1,000	2,889	1,463	5,352	------	1,734	213	409	286	908	3,596

See footnotes at end of table.

Table 66.—Salient statistics on wax in the United States, by types, months, and districts—Continued

(Thousand barrels)[1]

Month and district	1965 p										
	Production				Imports (all types)	Exports (all types)	Stocks, end of period				Domestic demand (all types)
	Micro-crystal-line	Fully refined	Other	Total			Micro-crystal-line	Fully refined	Other	Total	
By months:											
January	79	247	147	473	------	45	206	386	433	1,025	311
February	70	204	99	373	------	77	200	467	346	1,018	308
March	75	266	139	480	------	150	191	452	358	1,001	342
April	84	237	135	456	------	172	192	439	366	997	288
May	86	273	129	488	------	169	203	457	350	1,010	306
June	71	245	126	442	------	141	200	455	320	975	336
July	70	251	113	434	------	121	204	466	339	1,009	279
August	80	252	142	474	1	145	204	471	359	1,034	305
September	68	252	125	445	3	153	196	438	345	979	350
October	80	303	81	464	3	160	194	437	324	955	331
November	75	267	100	442	1	175	187	418	289	894	365
December	79	275	131	485	1	175	193	396	301	890	315
Total	917	3,072	1,467	5,456	11	1,649	193	396	301	890	3,836
By districts:											
East Coast	200	1,332	498	2,030	2		32	76	49	157	
Appalachian No. 1	174	49	206	429			28	42	11	81	
Appalachian No. 2	------	53	25	78			------	6	------	6	
Indiana, Illinois, Kentucky, etc.	20	269	161	450			2	19	118	139	
Minnesota, Wisconsin, etc.	------	------	------	------	------		------	------	------	------	
Oklahoma, Kansas, etc.	200	222	83	505		1,519	42	37	7	86	
Texas Inland	71	------	------	71			55	------	------	55	NA
Texas Gulf Coast	134	473	354	961			14	45	96	155	
Louisiana Gulf Coast	103	304	2	409	9		13	60	1	74	
Arkansas, Louisiana Inland, etc.	------	------	------	------			------	------	------	------	
New Mexico	------	------	------	------			------	------	------	------	
Rocky Mountain	15	74	12	101	------		7	40	19	66	
West Coast	------	296	126	422	------	130	------	71	------	71	
Total	917	3,072	1,467	5,456	11	1,649	193	396	301	890	3,836

p Preliminary. NA Not Available.
[1] Conversion factor: 280 pounds to the barrel.

Table 67.—Salient statistics of petroleum coke in the United States, by months and districts [1]

(Thousand barrels unless otherwise stated)

Month and district	1964 Production: Marketable	1964 Production: Catalyst	1964 Production: Total	1964 Yield (per cent)	1964 Exports	1964 Stocks, end of period	1964 Domestic demand	1965 [p] Production: Marketable	1965 [p] Production: Catalyst	1965 [p] Production: Total	1965 [p] Yield (per cent)	1965 [p] Exports	1965 [p] Stocks, end of period	1965 [p] Domestic demand
By months:														
January	2,903	4,297	7,200	2.6	1,473	6,421	5,789	3,345	4,133	7,478	2.6	361	7,303	6,609
February	2,712	4,003	6,715	2.6	863	6,564	5,709	3,124	3,907	7,031	2.8	471	7,536	6,327
March	3,132	4,155	7,287	2.6	945	6,646	6,260	3,153	4,087	7,240	2.6	795	7,538	6,443
April	2,895	3,936	6,831	2.7	1,126	6,794	5,557	2,798	3,862	6,660	2.6	1,078	7,697	5,428
May	2,938	4,107	7,045	2.6	1,516	6,893	5,430	2,861	4,087	6,948	2.5	896	7,821	5,928
June	3,092	4,088	7,180	2.6	1,109	6,963	6,001	2,789	4,246	7,035	2.6	1,564	7,740	5,552
July	3,226	4,279	7,505	2.6	1,430	7,086	5,952	3,001	4,373	7,374	2.5	1,271	7,553	6,290
August	2,834	4,241	7,075	2.5	1,020	6,894	6,247	2,996	4,449	7,445	2.6	1,467	7,301	6,230
September	2,675	4,072	6,747	2.5	990	6,696	5,955	2,975	4,239	7,214	2.6	821	7,088	6,606
October	2,774	4,136	6,910	2.5	1,039	6,619	5,948	2,830	3,962	6,792	2.4	1,049	7,071	5,760
November	2,797	3,973	6,770	2.6	965	6,878	5,546	2,991	4,067	7,058	2.5	1,034	7,053	6,042
December	2,894	4,166	7,060	2.5	1,142	6,795	6,001	3,455	4,310	7,765	2.7	1,017	7,389	6,412
Total	34,872	49,453	84,325	2.6	13,618	6,795	70,395	36,318	49,722	86,040	2.5	11,819	7,389	73,627
By districts:														
East Coast	6,168	8,150	14,318	3.2		601		5,441	8,325	13,766	3.1		726	
Appalachian No. 1	------	226	226	.6		------		------	236	236	.6		------	
Appalachian No. 2	20	529	549	1.5		------		------	473	473	1.2		------	
Indiana, Illinois, Kentucky, etc.	7,286	10,162	17,448	3.0		1,478		7,430	9,855	17,285	2.9		1,226	
Minnesota, Wisconsin, etc.	1,833	717	2,550	4.7		586		1,720	675	2,395	3.2		474	
Oklahoma, Kansas, etc.	3,337	4,312	7,649	2.8		1,074		3,659	4,125	7,784	2.8		1,219	
Texas Inland	471	1,657	2,128	1.8	7,100	4	NA	452	1,693	2,145	1.8	6,647	------	NA
Texas Gulf Coast	4,182	12,924	17,106	2.3		43		4,314	13,427	17,741	2.3		55	
Louisiana Gulf Coast	2,129	5,070	7,199	2.3		27		2,745	5,027	7,772	2.4		130	
Arkansas, Louisiana Inland, etc.	1,288	822	2,110	4.6		513		1,288	810	2,098	4.4		532	
New Mexico	------	51	51	.5		------		------	123	123	1.1		------	
Rocky Mountain	508	2,126	2,634	2.2		1,301		1,299	2,089	3,388	2.8		1,449	
West Coast	7,650	2,707	10,357	2.2	6,518	1,168		7,970	2,864	10,834	2.1	5,172	1,578	
Total	34,872	49,453	84,325	2.6	13,618	6,795	70,395	36,318	49,722	86,040	2.5	11,819	7,389	73,627

[p] Preliminary. NA Not available.

[1] Conversion factor: 5.0 barrels to the short ton.

Table 68.—Production of still gas in the United States by districts

Districts	1963		1964		p 1965	
	Million cubic feet	Equivalent in thousand barrels	Million cubic feet	Equivalent in thousand barrels	Million cubic feet	Equivalent in thousand barrels
East Coast	101,737	17,128	104,110	17,132	115,208	18,556
Appalachian No. 1	9,659	1,838	10,439	1,839	10,191	1,726
Appalachian No. 2	12,844	1,833	13,112	1,816	12,938	1,765
Indiana, Illinois, Kentucky, etc.	155,505	24,911	169,473	26,063	173,403	26,720
Minnesota, Wisconsin, North Dakota and South Dakota	8,454	1,303	10,050	1,437	8,755	1,476
Oklahoma, Kansas, etc.	69,463	11,255	70,434	11,116	72,919	11,464
Texas Inland	13,712	5,821	31,198	5,542	33,053	5,459
Texas Gulf Coast	186,844	26,120	196,107	27,526	181,912	26,555
Louisiana Gulf Coast	54,200	8,159	60,024	9,000	70,360	10,566
Arkansas, Louisiana Inland, etc.	11,628	2,001	11,082	1,776	13,036	2,204
New Mexico	1,483	283	1,896	317	1,917	340
Rocky Mountain	20,193	3,658	21,338	3,785	23,744	4,352
West Coast	133,824	25,288	133,023	23,908	134,103	24,112
Total	797,546	129,598	832,286	131,257	851,539	135,295

p Preliminary.

Table 69.—Production of miscellaneous finished oils in the United States in 1965, by districts and classes

(Thousand barrels)

District	Absorption	Petrolatum	Specialty oils [1]	Petrochemicals	Other products	Total
East Coast	------	------	1,025	396	370	1,791
Appalachian No. 1	------	88	66	------	24	178
Appalachian No. 2	------	------	28	------	4	32
Indiana, Illinois, Kentucky, etc.	------	53	330	523	115	1,021
Minnesota, Wisconsin, North Dakota, and South Dakota	------	------	------	93	------	93
Oklahoma, Kansas, etc.	73	413	663	1,074	274	2,497
Texas Inland	284	------	68	934	219	1,544
Texas Gulf	39	453	109	3,324	473	4,359
Louisiana Gulf	1,264	43	2	------	12	1,321
Arkansas, Louisiana Inland	1,081	------	------	------	14	1,095
Rocky Mountain, New Mexico	172	10	16	15	214	427
West Coast	27	28	1,149	875	470	2,549
Total: 1965	2,940	1,088	3,456	7,234	2,189	16,907
1964	3,236	1,195	3,460	6,646	2,240	16,777

[1] Specialty oils include: Hydraulic 0; insulating 108; medicinal 152; rust preventatives 5; sand frac 51; spray oils 487; and other 2,653.

FOREIGN TRADE

Foreign trade statistics reported in this section were compiled from two sources. The imports of crude oil and unfinished oils were obtained from the petroleum refining companies. Imports of the refined petroleum products and all export data are derived from data compiled by the Foreign Trade Division of the Bureau of Census in the U.S. Department of Commerce.

Imports.—The total imports of crude petroleum and petroleum products in 1965 was 900.7 million barrels, an increase of 74.0 million barrels for the year. Increased imports of residual fuel oil accounted for 48.8 million barrels of the increase, and crude oil accounted for 13.4 million barrels. Venezuela is the source of more than half of the petroleum imported into the United States since products shipped from the Netherlands Antilles and Puerto Rico were refined from crude oil of Venezuelan origin.

Exports.—The United States' export market for petroleum continued to decline in 1965. Total exports of crude petroleum and petroleum products were 67.9 million barrels for the year, 6.0 million less than in 1964. Although exports to most countries were lower for the year, the major decline was in shipments to Japan which decreased 5.6 million barrels. The tables showing exports by country of destination varies slightly from other export data in this chapter because of changes in product classification and late revisions.

Table 70.—Petroleum oils crude and refined, imported into the United States, by months [1]

(Thousand barrels)

Year and class	January	February	March	April	May	June	July	August	September	October	November	December	Total
1964:													
Crude petroleum	39,635	32,209	36,945	33,091	35,968	34,387	43,820	40,743	36,853	39,224	34,102	31,666	438,643
Refined products:													
Motor gasoline	603	561	1,005	1,009	1,453	778	746	955	700	937	811	924	10,482
Special naphthas	437	508	487	421	104	440	172	144	644	228	97	462	4,144
Kerosine	------	------	------	------	------	------	4	------	------	------	------	------	4
Distillate fuel oil	1,594	1,069	875	787	723	1,035	627	856	912	840	574	1,893	11,785
Residual fuel oil	39,721	29,187	24,712	27,863	19,797	17,748	20,460	18,447	18,915	24,712	23,342	30,867	295,771
Jet fuel	2,623	1,597	2,013	1,486	2,027	2,275	2,439	2,615	1,663	1,663	1,690	1,152	23,243
Lubricants	4	2	3	4	2	5	4	2	3	5	1	2	37
Wax	------	------	------	------	------	------	------	------	------	------	------	------	------
Asphalt (including natural)	354	140	230	274	487	1,048	833	578	595	522	452	399	5,912
Liquefied gases (including ethane)	420	447	321	246	185	232	352	266	298	416	410	535	4,128
Unfinished oils	3,219	1,699	2,530	3,004	3,391	2,742	2,434	3,343	1,859	2,449	2,627	3,290	32,587
Total refined	48,975	35,210	32,176	35,094	28,169	26,303	28,071	27,206	25,589	31,772	30,004	39,524	388,093
Total crude and refined	88,610	67,419	69,121	68,185	64,137	60,690	71,891	67,949	62,442	70,996	64,106	71,190	826,736
1965:p													
Crude petroleum	37,344	32,685	41,398	38,110	38,961	39,912	40,691	40,770	43,152	39,111	32,024	27,882	452,040
Refined products:													
Motor gasoline	513	489	912	304	469	1,256	1,040	1,030	722	1,205	619	1,493	10,052
Special naphthas	125	274	473	290	235	319	255	286	414	3	3	187	2,864
Kerosine	------	------	------	------	------	------	------	7	------	------	28	65	100
Distillate fuel oil	1,094	815	1,439	827	1,239	470	938	1,591	1,061	1,340	1,063	1,143	13,020
Residual fuel oil	38,726	34,225	34,738	34,071	24,615	23,640	22,126	20,400	19,963	27,476	26,093	38,532	344,605
Jet fuel, total	2,770	2,045	1,752	2,707	2,945	3,170	2,260	2,819	1,754	2,020	2,753	2,967	29,962
Naphtha type	1,920	1,258	784	1,806	1,735	1,845	874	1,395	484	1,001	1,716	1,675	16,493
Kerosine type	850	787	968	901	1,210	1,325	1,386	1,424	1,270	1,019	1,037	1,292	13,469
Lubricants	1	1	2	2	3	3	3	3	3	3	2	3	29
Wax	------	------	------	------	------	------	------	1	3	3	3	1	11
Asphalt (including natural)	397	416	325	415	420	875	619	878	744	486	388	339	6,302
Liquefied gases (including ethane)	620	614	686	408	369	497	481	623	670	665	843	1,077	7,553
Petrochemical feedstocks	------	------	------	------	------	------	------	------	------	269	206	25	500
Unfinished oils	3,000	2,589	2,461	2,549	2,563	3,057	2,844	2,306	3,055	2,777	3,375	3,130	33,706
Total refined	47,246	41,468	42,788	41,573	32,858	33,287	30,566	29,944	28,389	36,247	35,376	48,962	448,704
Total crude and refined	84,590	74,153	84,186	79,683	71,819	73,199	71,257	70,714	71,541	75,358	67,400	76,844	900,744

p Preliminary.
[1] Imports of crude and unfinished oils reported to the Bureau of Mines; imports of refined products compiled from records of the U.S. Department of Commerce.

Table 71.—Crude oil and petroleum products imported into the United States, 1964–65, by country and receiving district

(Thousand barrels)

Country	Crude oil [1]	Gasoline	Special naphtha	Kerosine [2]	Distillate fuel oil [2]	Residual fuel oil [2]	Military jet fuel	Commercial jet fuel	Liquefied gases	Asphalt	Unfinished oils [1]	Lubricants	Wax	Total
1964:														
North America:														
Canada	101,607	491	24	------	110	1,826	------	------	3,952	149	1,143	28	------	109,330
Canal Zone	------	------	------	------	------	349	------	------	------	------	------	------	------	349
Mexico	3,577	------	------	------	------	6,684	------	------	------	------	6,973	------	------	17,234
Netherlands Antilles	------	616	2,697	------	4,224	95,182	7,585	6,012	------	3,350	2,241	------	------	121,907
Panama	------	142	------	------	------	1,541	------	------	------	------	------	------	------	1,683
Puerto Rico	------	8,395	NA	------	3,891	4,787	------	------	------	------	------	------	------	17,073
Trinidad and Tabago	------	378	652	4	32	36,527	------	1,484	------	23	3,457	------	------	42,557
Total	105,184	10,022	3,373	4	8,257	146,896	7,585	7,496	3,952	3,522	13,814	28	------	310,133
South America:														
Argentina	------	------	------	------	------	1,290	------	------	------	------	------	------	------	1,290
Brazil	------	------	------	------	------	246	------	------	------	------	------	------	------	246
Colombia	9,606	------	------	------	------	1,485	------	------	------	------	------	------	------	11,091
Venezuela	174,222	91	771	------	3,528	142,136	4,533	3,629	174	2,356	10,188	------	------	341,628
Total	183,828	91	771	------	3,528	145,157	4,533	3,629	174	2,356	10,188	------	------	354,255
Europe:														
Italy	------	------	------	------	------	12	------	------	------	------	625	------	------	637
Netherlands	------	289	------	------	------	117	------	------	------	84	------	9	------	449
United Kingdom	------	------	------	------	------	------	------	------	------	------	149	------	------	149
West Germany	------	------	------	------	------	------	------	------	------	------	161	------	------	161
Total	------	289	------	------	------	129	------	------	------	84	935	9	------	1,896
Asia:														
Abu Dhabi	1,112	------	------	------	------	------	------	------	------	------	------	------	------	1,112
Aden	------	------	------	------	------	1	------	------	------	------	------	------	------	1
Bahrein	------	------	------	------	------	1,048	------	------	------	------	336	------	------	1,384
India	------	------	------	------	------	------	------	------	1	------	154	------	------	155
Iran	24,143	------	------	------	------	------	------	------	------	------	107	------	------	24,250
Japan	------	------	------	------	------	------	------	------	1	------	386	------	------	387
Kuwait	23,263	------	------	------	------	------	------	------	------	------	2,150	------	------	25,413
Leeward and Windward Isle	------	------	------	------	------	1	------	------	------	------	------	------	------	1
Neutral Zone	17,565	------	------	------	------	------	------	------	------	------	114	------	------	17,679
Qatar	7,294	------	------	------	------	------	------	------	------	------	116	------	------	7,410
Saudi Arabia	35,464	80	------	------	------	2,538	------	------	------	------	1,033	------	------	39,115
Singapore	------	------	------	------	------	------	------	------	------	------	531	------	------	531
Sumatra	23,047	------	------	------	------	------	------	------	------	------	1,708	------	------	24,755
Total	131,888	80	------	------	------	3,588	------	------	2	------	6,635	------	------	142,193

See footnotes at end of table.

Africa:														
Algeria	2,249	------	------	------	------	------	------	------	------	------	------	------	------	2,249
French Somaliland	------	------	------	------	------	1	------	------	------	------	------	------	------	1
Libya	14,417	------	------	------	------	------	------	------	------	------	------	------	------	14,417
United Arab Republic (Egypt)	1,077	------	------	------	------	------	------	------	------	------	1,015	------	------	2,092
Total	17,743	------	------	------	------	1	------	------	------	------	1,015	------	------	18,759
Total imports	438,643	10,482	4,144	4	11,785	295,771	12,118	11,125	4,128	5,912	32,587	37	------	826,736
Imports by PAD districts:														
District 1	252,527	9,163	3,633	4	10,559	274,306	10,804	7,781	308	5,405	21,151	31	------	595,672
District 2	37,801	3	21	------	64	804	------	------	2,509	148	478	3	------	41,831
District 3	1,835	------	435	------	1,119	11,204	------	------	------	359	1,011	------	------	15,963
District 4	4,409	1	------	------	------	45	------	------	112	------	------	1	------	4,568
District 5	142,071	1,315	55	------	43	9,412	1,314	3,344	1,199	------	9,947	2	------	168,702

See footnotes at end of table.

Country	Crude oil [1]	Gasoline	Special naphtha	Kerosine [2]	Distillate fuel oil [2]	Residual fuel oil [2]	Military jet fuel	Commercial jet fuel	Liquefied gases	Asphalt	Unfinished oils [1]	Lubricants	Wax	Petrochemical feedstocks	Total
1965:															
North America:															
Bahamas	------	------	----	----	------	2	------	------	----	----	------	----	----	----	2
Canada	107,762	170	35	1	21	1,964	------	------	7,451	183	395	23	3	----	118,008
Mexico	2,552	6	----	----	145	5,839	------	------	1	----	8,928	----	8	----	17,479
Netherland Antilles	------	512	2,447	----	5,255	103,439	6,056	7,232	----	3,456	3,066	----	----	----	131,463
Panama	------	------	----	----	64	1,231	------	------	----	----	------	----	----	----	1,295
Puerto Rico	------	7,711	NA	92	4,393	4,371	------	------	----	----	------	----	----	500	17,067
Trinidad and Tabago	------	498	7	----	57	37,600	5,658	1,235	----	39	3,078	----	----	----	48,172
Total	110,314	8,897	2,489	93	9,935	154,446	11,714	8,467	7,452	3,678	15,467	23	11	500	333,486
South America:															
Argentina	------	------	----	----	------	2,945	------	------	----	----	------	----	----	----	2,945
Barbados	------	------	----	----	------	20	------	------	----	----	------	----	----	----	20
Colombia	15,211	------	----	----	196	3,090	------	------	----	----	------	----	----	----	18,497
Venezuela	157,852	1,002	255	7	2,889	180,154	4,779	4,667	100	2,592	8,735	----	----	----	363,032
Total	173,063	1,002	255	7	3,085	186,209	4,779	4,667	100	2,592	8,735	----	----	----	384,494

Table 71.—Crude oil and petroleum products imported into the United States, 1964–65, by country and receiving district—Continued

(Thousand barrels)

Country	Crude oil [1]	Gasoline	Special naphtha	Kerosine [2]	Distillate fuel oil [2]	Residual fuel oil [2]	Military jet fuel	Commercial jet fuel	Liquefied gases	Asphalt	Unfinished oils [1]	Lubricants	Wax	Petrochemical feedstocks	Total
Europe:															
France	------	------	----	----	------	120	------	------	----	----	------	----	----	----	120
Italy	------	------	----	----	------	422	------	------	----	----	450	----	----	----	872
Netherlands	------	------	----	----	------	41	------	------	----	32	292	6	----	----	371
United Kingdom	------	------	----	----	------	95	------	------	----	----	------	----	----	----	95
West Germany	------	------	----	----	------	11	------	------	----	----	------	----	----	----	11
Total	------	------	----	----	------	689	------	------	----	32	742	6	----	----	1,469
Asia:															
Abu Dhabi	5,035	------	----	----	------	------	------	------	----	----	------	----	----	----	5,035
Bahrein	------	78	----	----	------	417	------	237	----	----	1,254	----	----	----	1,986
India	------	------	120	----	------	1	------	------	----	----	292	----	----	----	413
Iran	28,633	------	----	----	------	200	------	------	----	----	258	----	----	----	29,091
Iraq	5,695	------	----	----	------	------	------	------	----	----	3	----	----	----	5,698
Japan	------	------	----	----	------	1	------	------	1	----	1,011	----	----	----	1,013
Kuwait	20,208	------	----	----	------	------	------	------	----	----	1,861	----	----	----	22,069
Neutral Zone	9,756	------	----	----	------	------	------	------	----	----	------	----	----	----	9,756
Qatar	4,346	------	----	----	------	------	------	------	----	----	277	----	----	----	4,623
Saudi Arabia	48,235	75	----	----	------	2,642	------	98	----	----	1,715	----	----	----	52,765
Sumatra	22,170	------	----	----	------	------	------	------	----	----	822	----	----	----	22,992
Total	144,078	153	120	----	------	3,261	------	335	1	----	7,493	----	----	----	155,441
Africa:															
Algeria	3,256	------	----	----	------	------	------	------	----	----	------	----	----	----	3,256
Libya	15,152	------	----	----	------	------	------	------	----	----	1	----	----	----	15,153
Nigeria	5,296	------	----	----	------	------	------	------	----	----	------	----	----	----	5,296
United Arab Republic (Egypt)	881	------	----	----	------	------	------	------	----	----	1,268	----	----	----	2,149
Total	24,585	------	----	----	------	------	------	------	----	----	1,269	----	----	----	25,854
Total imports	452,040	10,052	2,864	100	13,020	344,605	16,493	13,469	7,553	6,302	33,706	29	11	500	900,744
Imports by PAD districts:															
District 1	258,361	9,158	2,300	92	11,130	318,559	12,926	9,704	182	5,106	23,260	27	2	500	651,307
District 2	41,264	1	27	----	17	1,188	------	214	4,146	146	213	----	----	----	47,216
District 3	------	------	537	7	1,740	14,598	------	51	----	1,050	377	1	9	----	18,370
District 4	4,807	------	----	----	------	43	------	------	684	----	------	----	----	----	5,534
District 5	147,608	893	----	1	133	10,217	3,567	3,500	2,541	----	9,856	1	----	----	178,317

[p] Preliminary. NA Not available.

[1] Imports of crude oil, unfinished oils, and receipts from Puerto Rico reported to the Bureau of Mines, imports of refined products compiled from records of the U.S. Dept. of Commerce.

[2] Includes quantities imported duty free for supply of vessels and aircraft engaged in foreign trade.

Table 72.—Petroleum oils, crude and refined, exported from the United States, including shipments to territories and possessions, by months [1]

(Thousand barrels)

Year and class	January	February	March	April	May	June	July	August	September	October	November	December	Total
1964:													
Crude petroleum	116	98	233	100	174	152	90	118	71	88	------	123	1,363
Refined products:													
Gasoline [2]	575	194	497	489	517	349	718	589	393	561	602	725	6,209
Special naphthas	130	138	123	124	149	100	238	226	139	181	90	192	1,830
Kerosine	5	25	10	12	22	6	23	9	11	10	20	17	170
Distillate fuel oil	1,211	419	604	303	317	271	403	199	538	515	245	361	5,386
Residual fuel oil	1,561	1,023	1,668	2,000	1,375	1,942	1,498	1,547	1,517	1,879	1,321	1,539	18,870
Jet fuel	36	13	14	14	11	11	12	9	12	9	13	16	170
Lubricants	1,200	1,440	1,365	1,983	1,284	1,630	1,647	1,691	1,242	1,660	1,483	1,551	18,176
Wax	122	137	130	121	172	136	141	171	168	152	129	155	1,734
Coke	1,473	863	945	1,126	1,516	1,109	1,430	1,020	990	1,039	965	1,142	13,618
Asphalt	55	56	43	85	39	54	81	55	110	54	53	74	759
Liquefied gases (including ethane)	404	386	433	410	437	498	475	485	413	426	462	529	5,358
Miscellaneous	12	22	23	21	18	17	20	21	23	21	17	21	236
Total refined	6,784	4,716	5,855	6,688	5,857	6,123	6,686	6,022	5,556	6,507	5,400	6,322	72,516
Total crude and refined	6,900	4,814	6,088	6,788	6,031	6,275	6,776	6,140	5,627	6,595	5,400	6,445	73,879
1965: [p]													
Crude petroleum	89	45	3	187	------	68	421	------	------	182	94	8	1,097
Refined products:													
Gasoline [2]	834	282	322	422	484	740	304	365	310	277	416	116	4,872
Special naphthas	68	65	109	214	155	164	193	109	150	112	121	99	1,559
Kerosine	8	11	8	22	31	55	14	22	15	16	10	7	219
Distillate fuel oil	370	245	552	246	311	235	272	278	478	119	286	281	3,673
Residual fuel oil	1,473	1,658	1,640	1,367	926	1,043	1,275	1,330	993	1,141	1,014	1,018	14,878
Jet fuel	21	12	13	123	92	119	28	36	13	10	71	49	587
Lubricants	1,286	1,072	1,583	1,858	1,717	1,322	1,367	911	1,409	1,570	1,214	1,366	16,675
Wax	45	77	150	172	169	141	121	145	153	160	141	175	1,649
Coke	361	471	795	1,073	896	1,564	1,271	1,467	821	1,049	1,034	1,017	11,819
Asphalt	11	34	35	44	32	61	40	36	28	23	25	23	392
Petrochemical feedstocks	4	215	230	126	278	25	212	284	28	22	199	328	1,951
Liquefied gases (including ethane)	487	462	761	479	573	677	543	685	674	555	869	755	7,520
Miscellaneous	26	59	103	107	91	102	107	62	78	76	76	73	960
Total refined	4,994	4,663	6,301	6,253	5,755	6,248	5,747	5,730	5,150	5,130	5,476	5,307	66,754
Total crude and refined	5,083	4,708	6,304	6,440	5,755	6,316	6,168	5,730	5,150	5,312	5,570	5,315	67,851

[p] Preliminary.
[1] Compiled from records of U.S. Department of Commerce.
[2] Includes benzol, natural gasoline, and antiknock compounds.

Table 73.—Crude petroleum and petroleum products exported from the United States by countries of destination and shipments to and exports from Territories and possessions

(Thousand barrels)

Country	Crude petroleum	Gasoline	Naphtha	Jet	Kerosine	Distillate oil	Residual oil	Lubricating oil	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrochemical feedstocks	Miscellaneous products	Total
1964:															
North America:															
Canada	7	331	506	-----	14	619	4,628	1,294	75	117	146	1,800	95	166	9,798
Mexico	3	232	104	150	2	479	2,429	105	102	5,027	169	66	2	53	8,923
Netherlands Antilles	(1)	3,484	(1)	-----	-----	-----	-----	15	(1)	(1)	(1)	-----	(1)	(1)	3,499
Other	-----	78	56	(1)	1	158	9	449	44	55	109	-----	4	41	1,004
Total	10	4,125	666	150	17	1,256	7,066	1,863	221	5,199	424	1,866	101	260	23,224
South America:															
Argentina	-----	1	1	-----	-----	-----	-----	444	4	25	1	-----	(1)	6	482
Brazil	-----	(1)	13	-----	16	-----	-----	1,165	1	10	30	59	(1)	90	1,384
Chile	-----	1	1	-----	1	1	-----	205	45	-----	52	-----	1	15	322
Colombia	-----	5	9	-----	(1)	5	-----	79	1	(1)	82	-----	(1)	28	209
Peru	-----	1	(1)	-----	-----	-----	397	158	1	-----	34	2	4	12	609
Venezuela	-----	156	12	-----	(1)	-----	-----	38	8	(1)	69	118	1	10	412
Other	-----	(1)	3	-----	(1)	-----	14	145	8	1	50	-----	1	16	238
Total	-----	164	39	-----	17	6	411	2,234	68	36	318	179	7	177	3,656
Europe:															
Belgium-Luxembourg	(1)	(1)	9	-----	1	116	-----	865	7	1	15	248	2	25	1,289
Denmark	-----	(1)	(1)	-----	-----	-----	-----	165	(1)	(1)	19	80	(1)	18	227
France	-----	(1)	33	(1)	1	3	437	87	3	10	57	944	8	5	1,588
Germany, West	-----	(1)	192	-----	27	-----	-----	479	1	59	178	1,084	16	81	2,017
Greece	-----	167	1	-----	-----	-----	1	96	(1)	1	1	-----	6	5	278
Italy	-----	411	28	-----	1	4	782	419	8	1	106	1,081	58	28	2,862
Netherlands	(1)	141	185	-----	6	373	590	427	2	2	95	1,498	21	29	3,369
Norway	-----	(1)	-----	-----	-----	-----	-----	25	(1)	(1)	2	652	(1)	7	686
Sweden	-----	1	(1)	-----	-----	684	-----	397	2	(1)	15	101	8	19	1,172
United Kingdom	336	2	319	-----	89	-----	1,228	1,137	55	10	76	239	47	39	3,527
Other	-----	1	30	-----	(1)	6	(1)	398	8	3	103	299	5	46	899
Total	336	723	797	(1)	75	1,186	3,038	4,495	81	87	667	6,076	156	247	17,914
Africa:															
Congo (Leopoldville)	-----	3	3	-----	1	-----	-----	100	6	-----	2	(1)	(1)	10	125
South Africa, Republic of	-----	77	87	-----	(1)	-----	180	592	86	2	122	(1)	6	60	1,212
United Arab Republic (Egypt)	-----	(1)	6	-----	-----	-----	-----	267	-----	1	(1)	-----	14	13	301
Other	-----	9	8	16	10	6	-----	284	32	1	32	126	5	39	568
Total	-----	89	104	16	11	6	180	1,243	124	4	156	126	25	122	2,206

Asia:															
India	-----	1	1	-----	1	10	6	1,481	4	(1)	3	100	19	140	1,766
Indonesia	53	(1)	-----	-----	-----	-----	-----	210	(1)	(1)	2	-----	(1)	12	277
Japan	952	1	146	-----	8	3,855	8,187	1,753	5	6	40	4,943	364	121	20,381
Malaysia	-----	(1)	(1)	-----	-----	(1)	-----	153	(1)	(1)	2	-----	(1)	9	164
Philippines	-----	(1)	9	-----	(1)	-----	(1)	390	19	-----	15	20	1	44	498
Turkey	-----	70	4	-----	1	-----	-----	467	5	-----	(1)	-----	26	48	621
Other	10	73	17	-----	1	(1)	2	1,200	57	9	51	45	12	95	1,572
Total	1,015	145	177	-----	11	3,865	8,195	5,654	90	15	113	5,108	422	469	25,279
Oceania:															
Australia	-----	(1)	30	-----	9	3	164	610	6	7	50	263	5	55	1,202
French Pacific Islands	-----	48	(1)	3	17	235	78	5	13	5	-----	-----	(1)	(1)	404
New Zealand	-----	1	17	-----	2	-----	-----	73	(1)	2	8	-----	(1)	33	136
Other	-----	-----	-----	-----	1	-----	3	(1)	11	10	-----	-----	-----	(1)	25
Total	-----	49	47	3	29	238	245	688	30	24	58	263	5	88	1,767
Grand Total	1,361	5,295	1,830	169	160	6,507	19,135	16,177	614	5,365	1,736	13,618	716	1,363	74,046
Shipments from the United States to Territories and possessions:															
Puerto Rico	-----	3	-----	-----	(1)	(1)	-----	137	124	(2)	(2)	(2)	(2)	6	270
Virgin Islands	-----	78	-----	-----	6	84	-----	7	278	(2)	(2)	(2)	(2)	(1)	453
Wake	-----	739	-----	-----	(1)	41	-----	(1)	11	(2)	(2)	(2)	(2)	(2)	791
Other	-----	40	-----	-----	3	137	-----	5	13	(2)	(2)	(2)	(2)	(2)	198
Total	-----	860	-----	-----	9	262	-----	149	426	(2)	(2)	(2)	(2)	6	1,712
Exports from Territories to foreign countries: Puerto Rico	-----	1	-----	-----	-----	1,382	266	(1)	(1)	7	-----	-----	-----	1	1,657
Total net shipments from the United States	1,361	6,154	1,830	169	169	5,387	18,869	16,326	1,040	5,358	1,736	13,618	716	1,368	74,101

See footnote at end of table.

Table 73.—Crude petroleum and petroleum products exported from the United States by countries of destination and shipments to and exports from Territories and possessions—Continued

(Thousand barrels)

Country	Crude petroleum	Gasoline	Naphtha	Jet	Kerosine	Distillate oil	Residual oil	Lubricating oil	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrochemical feedstocks	Miscellaneous products	Total
1965:															
North America:															
Canada	12	324	517	-----	17	658	4,547	1,323	76	60	147	1,718	73	170	9,637
Mexico	333	241	46	145	1	529	1,669	172	167	6,194	169	75	2	59	9,802
Netherlands Antilles	-----	2,232	1	-----	-----	-----	-----	11	(1)	(1)	2	-----	(1)	(1)	2,246
Other	-----	76	38	(1)	4	54	188	399	44	49	101	3	83	41	1,080
Total	345	2,873	602	145	22	1,241	6,404	1,905	287	6,303	419	1,791	158	270	22,765
South America:															
Argentina	-----	(1)	3	-----	(1)	-----	1	308	1	363	1	-----	(1)	6	683
Brazil	-----	2	21	-----	8	-----	-----	831	5	(1)	37	49	7	53	1,013
Chile	-----	(1)	(1)	-----	1	(1)	-----	199	11	(1)	48	-----	1	30	290
Colombia	(1)	(1)	5	-----	(1)	-----	-----	52	1	(1)	81	(1)	7	22	118
Peru	-----	(1)	2	-----	(1)	(1)	(1)	147	1	-----	80	1	2	17	202
Venezuela	(1)	1	14	-----	(1)	2	-----	38	2	(1)	48	2	2	9	118
Other	(1)	1	8	-----	-----	(1)	-----	115	81	(1)	51	(1)	5	12	218
Total	1	4	48	-----	9	2	2	1,690	52	868	246	52	24	149	2,642
Europe:															
Belgium-Luxembourg	-----	5	49	-----	(1)	145	1	681	1	(1)	12	206	6	18	1,124
Denmark	-----	(1)	(1)	-----	-----	395	-----	185	-----	(1)	15	(1)	2	10	607
France	-----	17	88	-----	(1)	1	337	56	2	5	45	652	118	9	1,270
Germany, West	-----	(1)	155	-----	28	161	(1)	229	1	7	222	616	19	21	1,459
Greece	-----	96	1	1	(1)	-----	-----	27	(1)	-----	1	68	1	5	200
Italy	-----	167	22	-----	1	32	447	293	4	8	106	1,215	225	22	2,543
Netherlands	-----	70	93	-----	6	675	544	197	32	3	42	1,905	5	28	3,595
Norway	-----	-----	(1)	-----	-----	-----	-----	52	1	-----	2	957	3	8	1,023
Sweden	-----	(1)	(1)	-----	-----	(1)	-----	369	1	-----	12	82	6	18	488
United Kingdom	352	-----	180	-----	31	7	933	1,056	8	802	68	227	561	51	4,276
Other	-----	(1)	12	-----	(1)	(1)	15	535	8	(1)	82	361	8	32	1,053
Total	352	355	545	1	66	1,416	2,277	3,680	58	825	607	6,290	949	217	17,638
Africa:															
Congo (Leopoldville)	-----	-----	1	-----	(1)	-----	-----	31	1	-----	1	-----	1	5	40
South Africa, Republic of	-----	(1)	48	-----	(1)	-----	-----	467	9	1	138	-----	189	74	926
United Arab Republic (Egypt)	-----	(1)	5	-----	(1)	-----	-----	130	-----	-----	-----	-----	1	4	140
Other	-----	117	6	-----	5	-----	(1)	256	2	1	35	(1)	8	61	491
Total	-----	117	60	-----	5	-----	(1)	884	12	2	174	(1)	199	144	1,597

Asia:															
India	-----	([1])	4	-----	1	-----	47	1,085	2	([1])	4	([1])	2	126	1,271
Indonesia	-----	-----	([1])	-----	-----	-----	-----	213	([1])	-----	([1])	-----	1	21	235
Japan	306	11	181	-----	22	2,191	5,327	1,817	7	13	37	4,722	12	127	14,773
Malaysia	-----	([1])	5	-----	([1])	-----	([1])	262	-----	-----	2	-----	1	11	281
Philippines	-----	([1])	23	-----	([1])	([1])	-----	422	6	([1])	14	12	7	41	525
Turkey	-----	98	1	-----	3	-----	-----	520	1	-----	1	-----	3	39	666
Other	-----	299	17	2	2	2	875	1,406	22	2	68	158	12	99	2,964
Total	306	408	231	2	28	2,193	6,249	5,725	38	15	126	4,892	38	464	20,715
Oceania:															
Australia	-----	([1])	47	-----	11	-----	1	228	2	([1])	60	238	574	58	1,219
French Pacific Islands	-----	63	([1])	6	23	190	64	5	([1])	2	-----	-----	-----	([1])	353
New Zealand	-----	([1])	12	-----	2	-----	-----	71	([1])	1	14	-----	2	31	133
Other	-----	-----	([1])	-----	([1])	-----	-----	3	1	([1])	-----	-----	-----	-----	4
Total	-----	63	59	6	36	190	65	307	3	3	74	238	576	89	1,709
Grand total	1,004	3,820	1,545	154	166	5,042	14,997	14,191	450	7,511	1,646	13,263	1,944	1,333	67,066
Shipments from the United States to Territories and possessions:															
Puerto Rico	-----	96	17	62	46	8	([2])	117	3	([2])	([2])	([2])	([2])	12	361
Virgin Islands	-----	92	1	-----	4	80	([2])	5	2	([2])	([2])	([2])	([2])	([1])	184
Wake	-----	727	2	583	([1])	39	([2])	7	-----	([2])	([2])	([2])	([2])	([1])	1,358
Other	-----	72	([1])	35	4	169	([2])	8	2	([2])	([2])	([2])	([2])	([1])	290
Total	-----	987	20	680	54	296	([2])	137	7	([2])	([2])	([2])	([2])	12	2,193
Exports from Territories to foreign countries: Puerto Rico	-----	25	([1])	-----	([1])	1,597	186	1	-----	7	([1])	-----	-----	([1])	1,816
Total net shipments from the United States	1,004	4,782	1,565	834	220	3,741	14,811	14,327	457	7,504	1,646	13,263	1,944	1,345	67,443

[1] Less than ½ unit.
[2] Not separately classified.

Table 74.—World production of crude petroleum by countries

(Thousand barrels [1])

Country	1961	1962	1963	1964	1965 [p]
North America:					
Canada	220,861	244,139	258,435	275,364	296,997
Cuba [e, 2]	80	90	72	[r] 264	264
Mexico	106,784	111,830	114,867	115,576	117,959
Trinidad	45,768	48,876	48,678	[r] 49,731	48,859
United States	2,621,758	2,676,189	2,752,723	[r] 2,786,822	2,848,514
Total	2,995,251	3,081,124	3,174,775	[r] 3,227,757	3,312,593
South America:					
Argentina	84,418	98,154	97,221	100,370	98,262
Bolivia	2,989	2,917	3,285	3,195	3,357
Brazil	34,807	33,401	35,714	33,310	34,342
Chile	9,263	11,689	13,206	13,687	12,704
Colombia	53,247	51,918	60,343	62,596	73,196
Ecuador	2,926	2,573	2,465	2,796	2,850
Peru	19,371	21,134	21,468	23,119	23,068
Venezuela	1,065,757	1,167,916	1,185,511	1,241,782	1,267,602
Total	1,272,778	1,389,702	1,419,213	1,480,855	1,515,381
Europe:					
Albania	5,144	5,238	[r] 5,009	[r] 5,096	[e] 5,338
Austria	16,237	16,694	18,271	18,571	19,908
Bulgaria	1,510	1,453	1,266	1,168	1,672
Czechoslovakia	1,045	1,200	1,220	1,322	1,404
France	15,578	17,071	18,117	[r] 20,428	21,774
Germany, West	44,960	48,943	53,325	[r] 55,415	56,945
Hungary	11,117	[r] 12,518	13,398	13,742	13,749
Italy	13,432	[r] 12,403	12,155	18,184	15,055
Netherlands	14,271	14,974	15,377	15,758	16,630
Poland	1,503	1,502	1,577	2,092	2,510
Rumania	86,321	88,420	91,171	92,383	93,693
U.S.S.R. [3]	1,212,300	1,359,600	1,504,300	[r] 1,643,500	1,786,000
United Kingdom	784	820	910	939	606
Yugoslavia	9,479	11,299	11,930	13,322	15,281
Total [3]	1,433,681	[r] 1,592,135	[r] 1,748,026	[r] 1,901,920	2,050,565
Africa:					
Algeria [4]	121,494	158,094	184,311	[r] 204,300	206,258
Angola	757	3,404	5,776	6,535	4,734
Congo, Republic of (Brazzaville)	724	926	820	619	534
Gabon, Republic of	5,446	5,992	6,446	7,668	9,100
Libya	6,642	67,052	167,786	315,642	445,374
Morocco	603	968	1,140	910	782
Nigeria	16,802	24,624	[r] 27,913	43,997	99,354
Senegal	16	3	------	------	------
United Arab Republic (Egypt)	26,136	32,321	38,759	43,915	45,556
Total	178,620	293,384	[r] 432,951	[r] 623,586	811,692
Asia:					
Bahrain	16,444	16,446	16,503	18,000	20,788
Burma	4,218	4,366	4,761	[r] 4,160	[e] 4,100
China, mainland [e]	45,260	49,640	54,750	62,050	73,000
India	3,356	8,016	12,266	16,965	22,494
Indonesia	155,369	167,771	165,002	[r, 5] 169,250	[5] 178,190
Iran	431,653	481,939	538,107	618,731	688,215
Iraq	365,594	366,832	422,581	[r] 461,961	482,461
Israel	1,133	1,126	1,091	[r] 1,440	1,469
Japan	4,590	5,316	5,485	4,590	4,944
Kuwait	600,226	669,284	705,471	774,815	791,903
Kuwait-Neutral Zone	65,153	89,224	114,535	[r] 131,416	132,285
Mongolia [e]	360	360	360	360	115
Pakistan	2,829	3,338	3,514	[r] 3,742	3,943
Qatar	64,386	67,911	70,129	77,740	84,215
Sarawak and Brunei	30,551	28,286	29,639	26,265	29,342
Saudi Arabia	508,269	555,056	594,592	628,095	739,078
Taiwan (Formosa)	17	14	19	61	131
Trucial States	------	5,976	17,571	67,465	102,804
Turkey	3,075	4,157	5,090	[r] 6,397	10,827
Total [3]	2,302,483	2,525,058	2,761,466	[r] 3,073,503	3,370,304

Table 74.—World production of crude petroleum by countries—Continued
(Thousand barrels)

Country	1961	1962	1963	1964	1965 p
Oceania:					
Australia	----------	----------	----------	r 1,491	2,614
New Zealand	4	4	4	4	5
West Irian	1,082	917	924	(5)	(5)
Total	1,086	921	928	r 1,495	2,619
World total	8,183,899	r 8,882,324	r 9,537,359	r 10,309,116	11,063,154

e Estimate. p Preliminary. r Revised.
[1] 42-gallon barrels.
[2] Natural naphtha and gas oil.
[3] U.S.S.R. in Asia (including Sakhalin) included with U.S.S.R. in Europe.
[4] Including Sahara.
[5] Beginning May 1, 1963, West Irian transferred to Indonesia; production data for West Irian for 1964 and 1965 included under Indonesia.

NATIVE ASPHALT

Bituminous Limestone, Sandstone, and Gilsonite.—To avoid disclosure of individual company operations, it is necessary to report a combined production and value for these commodities. Production in 1965 was 1,912,000 short tons, 23,000 tons less than in 1964. The value for the year was $9,461,000 compared with $10,038,000 a year ago. The limestone was produced in Alabama and Texas, the sandstone in Missouri, and the gilsonite in Utah. The gilsonite is processed at a refinery in southern Colorado.

HELIUM

By Edwin M. Thomasson [1]

Helium shipments for 1965 exceeded the volume shipped during the previous year for the 16th successive time. Shipments from Bureau of Mines helium plants were 698.6 million cubic feet, [2] about 4.7 percent more than in 1964. Production at Bureau of Mines plants totaled 757.4 million cubic feet, and an additional 3,549.6 million cubic feet was produced by private companies participating in the helium conservation program and purchased by the Bureau of Mines and stored underground for future use.

The Bureau of Mines continued to sell helium at $35 per thousand cubic feet, the price established in 1961.

Production and sales of helium increased from the one private plant operating entirely outside the Government's helium program. A second private plant was virtually complete at yearend, although actual production had not commenced.

INTRODUCTION

Helium, second lightest of the elements, is a colorless, odorless, completely inert gas. Discovered on the sun in 1868, it was known to occur only there until 1895, when it was found on earth in a gas extracted from the uranium-bearing mineral cleveite. Not until 1905 was it discovered in some natural gases, the sole economic source today.

The need for a light, nonflammable gas for use in airships in World War I focused interest on this unique resource, and wartime impetus spurred development of new technology to extract helium from natural gases using a low-temperature gas liquefaction process.

Although the extraction process was not developed in time to produce significant quantities of helium for use during World War I, production continued after the close of the war, with helium being used almost entirely as a lifting gas in lighter-than-air craft. World War II gave added importance to helium, both as a lifting gas for the famous blimps and for use in shielded-arc welding. Helium was also vital in the development of the atomic bomb.

The scientific and technological revolution which followed World War II developed many new roles for this unique element, and helium use in the United States is now more than eight times the peak wartime consumption.

The purity of helium extracted at Bureau of Mines plants has, through the years, increased to meet the demand as uses changed from essentially lighter-than-air craft to modern applications in atomic energy, space, and cryogenic research. Helium produced before 1945 was about 98 percent pure (containing about 2 percent nitrogen), which was adequate for the then predominant use in lighter-than-air craft. In 1945 a small amount of higher purity helium (99.9 percent) was produced to provide an inert atmosphere for shielded-arc welding. By 1949, grade A helium, having a purity of 99.995 percent (impurities of 50 parts per million or less), was available in commercial quantities. Currently, all customers obtaining helium from the Bureau of Mines can expect to receive helium with a purity of at least 99.995 percent. The principal impurity in grade A helium is neon.

Today helium is an essential material in many of our space and missile programs, in defense, in atomic energy, in research and technology, in undersea exploration, and in industry.

[1] Staff engineer, Office of Assistant Director—Helium.

[2] All volumes of gases reported in this chapter are measured at 14.7 pounds per square inch absolute and 70° Fahrenheit.

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PRODUCTION

Helium was produced at 11 helium extraction plants in the United States during 1965. A 12th plant was virtually complete at yearend, although sustained production therefrom had not commenced. For convenience, the 11 helium producing plants can be segregated into three categories: (1) the plants owned by the Federal Government and operated by the Bureau of Mines, producing grade A helium (99.995-percent purity) for sale to both Federal agencies and to private (commercial) customers; (2) the helium "conservation" plants, privately owned and operated, but whose entire plant output of crude helium (50- to 85-percent purity) is purchased by the Bureau of Mines for conservation purposes; and (3) privately owned plants producing grade A helium for independent sale in the commercial market. Production from all 11 plants was 4,365.1 million cubic feet in 1965, an increase of about 8.3 percent over the 4,027.4 million cubic feet produced in 1964. Table 1 shows the helium produced in the United States since 1921.

Table 1.—Helium production in the United States

(Million cubic feet)

Year	Production
1921–28	[1] 5.8
1929–42	[1] 11.8
1943–49	[1] 83.5
1950–54	[1] 138.0
1955–59	[1] 313.4
1960	642.0
1961	727.6
1962	713.4
1963	2,231.5
1964	4,027.4
1965	4,365.1
Total 1921–65	15,760.1

[1] Annual average.

BUREAU OF MINES PLANTS

The Bureau of Mines operates five federally owned helium extraction plants, located at Amarillo and Exell, Tex.; Keyes, Okla.; Otis, Kans.; and Shiprock, N. Mex. These plants produced a combined total of 757.4 million cubic feet of helium during 1965, a decrease of about 3.4 percent from the 784.5 million cubic feet produced in 1964. Each of the five Bureau of Mines plants processed essentially all natural gas available to them and operated without difficulty throughout the year.

Additionally, 20,709,000 cubic feet of stored helium was withdrawn from either the crude helium conservation pipeline or the Cliffside gasfield and purified at Bureau of Mines plants to supplement regular production to supply market demand during the months when helium-bearing natural gas supplies to the plants were low. Overall, however, production from Bureau of Mines plants exceeded demand, and during the year 114 million cubic feet of helium from these plants was added to underground storage.

To effect operating economies and better manpower utilization, the Otis, Kans., helium plant ceased production of grade A helium in July 1965, and began producing only crude helium. The crude helium produced is transported in the Bureau of Mines 8-inch pipeline, along with helium purchased under the helium conservation program, to the Government-owned Cliffside gasfield near Amarillo, Tex., where it is stored underground until needed. Shipment to customers from the Otis plant was discontinued at the time of the operational changeover.

All other Bureau of Mines plants produced only grade A helium. Table 2 shows the production from each plant.

CONSERVATION PLANTS

There are five helium conservation plants in the United States. These plants are owned and operated by private companies, but their entire output is purchased, under long-term contracts, by the Bureau of Mines for conservation purposes. The conservation plants extract crude helium (a mixture of principally helium and nitrogen, containing 50 to 85 percent helium) from natural gas before the natural gas is delivered as fuel.

During 1965, the five conservation plants produced and delivered to the Bureau of Mines 3,549.6 million cubic feet of helium, an increase of 11 percent over 1964 production.

A more complete discussion of the helium conservation program is presented later in this chapter.

PRIVATE PLANTS

There is only one helium extraction plant in the United States which operated

Table 2.—Production of helium by Bureau of Mines plants

(Million cubic feet)

Plant location	Production 1964	Production [1] 1965
Amarillo, Tex.	51.3	50.2
Exell, Tex.	307.5	288.8
Keyes, Okla.	298.8	300.9
Otis, Kans.	44.8	36.9
Shiprock, N. Mex.	82.1	80.6
Total	784.5	757.4

[1] Does not include 20,709,000 cubic feet withdrawn from storage and purified in Bureau of Mines plants.

during the year entirely outside the Federal helium program. This plant, owned and operated by Kerr-McGee Oil Industries, Inc., is located near Navajo, Ariz., and produces grade A helium for sale to the commercial market. The plant, which has a design capacity of about 60 million cubic feet of helium per year, extracts helium from noncombustible, naturally occurring gas deposits in the Pinta Dome and Navajo Springs fields in Apache County, Ariz.

Production in 1965 is believed to be near the design capacity of the plant. The company markets the helium to non-Federal customers, principally on the west coast.

Construction of a second privately owned and operated helium extraction plant, the Kansas Refined Helium Company plant located near Otis, Kans., was virtually complete at yearend. However, actual helium production has not commenced. The plant, when operative, will extract helium from natural gas produced northwest of Otis, and is expected to be operational early in 1966. Although specific details are not available, it is believed that a large part of the plant production will be purchased by the Air Reduction Sales Company for distribution and resale to private consumers throughout the country. Announced plans include the installation of a 500-liter-per-hour helium liquefier at the plant, with the Air Reduction Sales Company operating a large-scale bulk liquid helium distribution system.

SHIPMENTS

Helium shipments from Bureau of Mines plants in 1965 totaled 698.6 million cubic feet, an increase of 4.67 percent over the 667.4 million cubic feet shipped in 1964. Federal agencies received 479.1 million cubic feet, and 219.5 million cubic feet was sold to non-Federal customers. In delivering helium to customers, the five Bureau plants filled and dispatched 1,991 railway tank cars, 1,088 highway semitrailers, and 227,043 standard gas cylinders. Table 3 shows the shipments of helium from each Bureau of Mines plant.

Direct shipment of helium to customers was discontinued at the Bureau's Otis, Kans., plant in July 1965. However, all other Bureau plants continued to load and ship helium. The Amarillo, Tex. plant is specially equipped to fill, process, load, and ship helium in standard gas cylinders (Interstate Commerce Commission 3A and 3AA cylinders), and all cylinder shipments originate there. The plant can also load and ship highway semitrailers. The Exell, Tex., Keyes, Okla., and Shiprock, N. Mex. plants are equipped to load and ship both railway tank cars and highway semitrailers.

The Bureau of Mines neither acquired nor disposed of any railway tank cars or highway semitrailers during the year. Thus, the active railway tank car fleet remained

Table 3.—Shipments of helium from Bureau of Mines plants, 1965

(Million cubic feet)

Plant	Shipments: Federal agencies	Shipments: Non-Federal customers	Total shipments
Amarillo, Tex.	52.2	62.2	114.4
Exell, Tex.	185.5	31.2	216.7
Keyes, Okla.	143.2	113.5	256.7
Otis, Kans. [1]	15.9	9.9	25.8
Shiprock, N. Mex.	82.3	2.7	85.0
Total	479.1	219.5	698.6

[1] Shipments discontinued July 1965.

at 233, and the semitrailer fleet at 7. Many helium customers, both Federal and non-Federal, also own highway semitrailers used to transport helium from Bureau plants.

About 2,500 cylinders, which had been on loan from the U.S. Air Force, were returned to that agency; however, almost 20,000 cylinders surplus to the needs of the Department of the Navy were acquired by the Bureau of Mines, thus increasing the cylinder pool from some 87,000 to approximately 103,000.

All helium shipments from Bureau of Mines plants are as a compressed gas. Available facilities at the four plants making direct shipments to customers permit filling shipping containers to maximum pressures of 4,000 pounds per square inch.

Now that it is no longer a large user of helium, the Department of the Navy closed its three helium redistribution centers which for many years had supplied helium in small cylinders to many Federal helium users throughout the United States. To replace this service, the General Services Administration awarded contracts to private companies to supply the helium needs of these and other Federal customers. These private companies, as formerly did the Navy, purchase helium in large lots from the Bureau of Mines, repackage it in smaller lots, and distribute it to the ultimate using facility to reduce freight costs. Experience to date under the contracts has been very satisfactory, and the overall cost to the Government has been reduced.

CONSUMPTION AND USE

In addition to the helium sold and shipped by the Bureau of Mines plants, some 58 million cubic feet of privately produced helium was marketed. Consequently, the total volume of helium delivered to consumers and presumably used in 1965 was about 757 million cubic feet, or some 6 percent more than the 1964 consumption of 713 million cubic feet.

Over one-half of the helium consumed in the United States was used in various phases of the Nation's space and missile programs. Shielded-arc welding and research applications consumed significant quantities of helium, and helium use in gas chromatography, leak detection, and other industrial applications is steadily increasing.

Table 4 shows shipments of helium from Bureau of Mines plants to various classes of customers, and table 5 shows the volume of helium used (sold) in the United States since 1950.

Table 4.—Shipments of helium from Bureau of Mines helium plants to various customers

Recipient	1964		1965	
	Million cubic feet	Percent	Million cubic feet	Percent
Federal agencies:				
Department of Defense	347.3	52.0	313.2	44.8
Atomic Energy Commission	64.8	9.7	59.9	8.6
National Aeronautics and Space Administration	79.7	11.9	99.9	14.3
Weather Bureau	7.0	1.1	5.6	.8
Other	.6	.1	.5	.1
Total Federal agencies	499.4	74.8	479.1	68.6
Non-Federal customers	168.0	25.2	219.5	31.4
Total shipments	667.4	100.0	698.6	100.0

Table 5.—Helium use in the United States

(Million cubic feet)

Year	Quantity	Year	Quantity
1950	81	1958	352
1951	109	1959	375
1952	145	1960	475
1953	158	1961	551
1954	190	1962	[1] 630
1955	236	1963	[1] 662
1956	267	1964	[1] 713
1957	310	1965	[1] 757

[1] Includes helium produced and sold by the privately owned Kerr-McGee plant at Navajo, Ariz.

RESOURCES

A continuing survey of the helium resources of the United States is conducted by the Bureau of Mines. Natural gas samples from wells and fields throughout the country are obtained and analyzed for helium content. During 1965, 668 such samples from 24 States were subjected to analysis.

Samples taken from a deep test well in Wyoming revealed helium-bearing gases that may be of potential importance in several deep reservoirs. Gas recovered from the test well was considered by the operator to be nonmarketable as fuel, because of low-heating value and high-sulfur content. The well was therefore plugged and abandoned.

The limited information available from this single well makes precise evaluation of the helium resources impossible, although it indicates that such resources are significant. Commercial development or production of the natural gas is not anticipated in the foreseeable future. The deep reservoirs, therefore, represent a potential, although not adequately evaluated, source of helium which could possibly be developed if future needs demand. The depth of the helium-bearing reservoirs and the nature of the natural gas would make helium recovery from the field expensive in comparison with currently available helium resources.

U.S. helium resources in helium-bearing natural gas containing at least 0.3 volume-percent helium are estimated to be approximately 194 billion cubic feet as of January 1, 1963, the date of the latest estimate. About 92 percent of these resources are located in five major helium-bearing natural gasfields: (1) the Hugoton field of Kansas, Oklahoma, and Texas, (2) the Panhandle field of Texas, (3) the Keyes field of Oklahoma, (4) the Greenwood field of Kansas and Colorado, and (5) the Cliffside field of Texas. All of these fields are within about 200 miles of Amarillo, Tex.

Other helium-bearing natural gas deposits occur in western Colorado, eastern Utah, northwestern New Mexico, Arizona, Wyoming, Montana, and Michigan. In general, the helium resources in these areas are limited, and occur in widely scattered, usually small, fields.

About 10 percent of the known helium-bearing natural gas resources in the United States are available to the five Bureau of Mines helium extraction plants. The two largest Bureau plants, at Exell, Tex. and Keyes, Okla., extract helium from gas produced from the Panhandle and Keyes fields. The Cliffside field provides the source gas for the Amarillo, Tex., helium plant and is the only developed source of helium-bearing natural gas owned by the Government. The plants at Shiprock, N. Mex., and Otis, Kans., extract helium from gas produced from small helium-bearing gasfields.

In addition to helium-bearing natural gas, other sources of helium—such as gases from mineral springs, fumaroles, and volcanoes; the air; rocks and minerals; and meteorites—are of general and scientific interest. However, none of these occurrences offer an economically feasible source material from which to extract helium. Helium-bearing natural gases are the only economical source of helium, and this situation seems unlikely to change in the foreseeable future.

CONSERVATION

Helium occurs as a minor constituent in certain natural gases, and because it is a completely inert element, contributes nothing to the fuel value of the natural gases. Unless this helium is removed before the natural gas is consumed as fuel, the contained helium is lost.

Helium resources are diminishing rapidly as helium-bearing natural gas is consumed as fuel, and these resources appear adequate to meet predicted future needs only if the loss of this vital element is curtailed. This need to conserve a diminishing and irreplaceable natural resource was recognized, and the Congress enacted the Helium Act Amendments of 1960 (Public Law 86-777). The new law included an authorization for the Bureau of Mines to purchase helium for conservation and ultimate resale. Authority to enter into purchase contracts, in an aggregate amount not to exceed $47.5 million per year, was granted in the act (Public Law 87-122) making appropriations for the U.S. Department of the Interior and related agencies for the fiscal year ending June 30, 1962.

Under these authorizations, the U.S. Department of the Interior, through the Bureau of Mines, launched a long-term helium conservation program in 1961. The Department entered into four contracts under which four private companies agreed to finance, build, and operate five plants to recover helium from natural gas before the natural gas goes to market. Each contract is for 22 years and provides that the Bureau of Mines will purchase up to specified limits, the entire output of helium from each plant. The four contracts utilize the entire $47.5 million per year contracting authority established by Congress.

Concurrently, the Bureau constructed a 425-mile pipeline to connect these plants with the Government's Cliffside gasfield and conditioned the wells in the Cliffside gasfield to facilitate injection of the helium into a natural gas-bearing formation. The pipeline extends from Bushton, Kans., to the Cliffside field near Amarillo, Tex.

Two of the conservation plants began production in 1962, the Northern Helex Co. plant near Bushton, Kans., and the Phillips Petroleum Co. plant in Hansford County, Tex. The remaining three plants—the Cities Service Helex, Inc., plant at Ulysses, Kans.; the National Helium Corp. plant near Liberal, Kans.; and the Phillips Petroleum Co. plant at Dumas, Tex.—commenced operations during 1963.

In conception and operation, the helium conservation program is essentially a simple program. Helium-bearing natural gas, on the way to market, is routed through one of the five conservation plants, where the helium and some nitrogen are removed by low-temperature processing. The natural gas is returned to the pipeline for transmission to market. The gaseous helium-nitrogen mixture, ranging from 50 to 85 percent helium, is delivered to the Bureau of Mines pipeline, through which it is transported to the Cliffside field. At the Cliffside field it is injected into a partially depleted gas-bearing formation, to be stored until needed. When needed, the helium-nitrogen mixture will be withdrawn and purified. The pure helium will then be sold to fulfill governmental and industrial requirements.

Table 6 shows the quantities of helium purchased by the Bureau of Mines from each of the conservation plants since the inception of the conservation program.

Whenever production at Bureau plants has exceeded market requirements, the helium produced in excess of demand has been stored in the Cliffside field. Table 7 shows the amounts stored each year and the amount in storage at yearend.

Table 6.—Helium purchased by the Bureau of Mines for conservation

(Million cubic feet)

Company and location of plant	Helium delivered			
	1962	1963	1964	1965
Northern Helex Co., Bushton, Kans.	1.9	208.1	493.9	585.1
Cities Service Helex, Inc., Ulysses, Kans.	—	75.3	492.2	638.6
National Helium Corp., Liberal, Kans.	—	457.5	1,184.4	1,310.2
Phillips Petroleum Co., Dumas, Tex.	—	197.7	458.7	513.6
Phillips Petroleum Co., Hansford Co., Tex.	0.5	481.7	563.9	502.1
Total	2.4	1,420.3	3,193.1	3,549.6

Table 7.—Helium in conservation storage

(Million cubic feet)

Year	Amount stored during year		Amount in storage on Dec. 31
	From Bureau of Mines plants	From conservation plants	
1960	[1] 273	—	273
1961	174	—	447
1962	75.2	2.4	524.6
1963	165.0	1,420.3	2,109.9
1964	131.0	3,193.1	[2] 5,433.3
1965	114.1	3,530.8	[3] 9,076.3

[1] Stored during 1960 and in previous years.
[2] Total reflects 0.734 million cubic feet withdrawn from storage during 1964.
[3] Total reflects 1.943 million cubic feet withdrawn from storage during 1965.

PRICES

The revised Helium Act (Public Law 86–777) directs agencies of the Federal Government to purchase all major helium requirements from the Secretary of the Interior. It also provides that helium shall be sold at prices adequate to sustain the program and to cover all costs of carrying out the provisions of the Act, including repayment to the Treasury of the United States, with interest, the net capital and retained earnings when the Act was passed.

The helium sales price necessary to fulfill these requirements was calculated to be $35.00 per thousand cubic feet, and on November 18, 1961, this price went into effect, applicable to all purchasers. This price has remained without change and is still in effect, although it is periodically reviewed in light of current conditions to determine whether revision is necessary or desirable. Revised regulations, a schedule of charges, and other information on the sale of helium and rental of containers by the Bureau of Mines are included in the Code of Federal Regulations (30 CFR 1).

Published rate schedules for private helium sales are not available, but it is believed that such sales have been at a price comparable to the Bureau of Mines price. Liquid helium prices vary substantially, depending on the supplier, size of liquefier, volume of sale, and other factors. Over the past few years, however, liquid helium prices have trended downward.

FOREIGN TRADE

Helium is exported under licenses issued by the Office of Munitions Control, U.S. Department of State. Exports amount to less than 0.5 percent of the annual domestic consumption. It is believed that most exported helium is used in fundamental and applied research, in chromatography, and in various atomic energy applications.

In December 1963, a helium plant near Swift Current in Saskatchewan Province, Canada, commenced operation. The plant has an annual production capacity of 12 million cubic feet and produces grade A helium from a small, nonflammable helium-bearing gas deposit. The helium is marketed principally in Canada and Europe. The Canadian plant is the only helium production facility in the free world outside the United States.

TECHNOLOGY

A helium bubble chamber, claimed to be the largest ever built, was completed at Northwestern University. The chamber is 20 inches wide and has a capacity of 40 liters. It will be used with the 400 million-electron-volt cyclotron at the University of Chicago, and plans call for hooking it to the 12.5-billion-electron-volt zero-gradient synchrotron at Argonne National Laboratory in 1966. It will be used for a wide range of subatomic particle studies.

A laboratory model helium diffusion cell was announced with the claim to process ordinary (grade A) helium to 99.99995-percent purity levels. Purification is accomplished by diffusion through quartz microbore tubing, and outputs up to 450 cubic centimeters per minute are attainable for various laboratory and other special applications.

Two experiments during the year again indicated the relative safety of helium-oxygen atmospheres to men. In the Sealab-II, aquanauts lived for up to 45 days some 200 feet below the sea, breathing a mixture of helium and oxygen under high pressure. The aquanauts were able to leave the Sealab-II vessel almost at will and perform useful work in the hostile ocean environment. Four Air Force officers spent 68 days in a simulated spacecraft at Brooks Air Force Base, San Antonio, Tex., in an atmosphere of 70 percent oxygen and 30 percent helium at a pressure of about 5 pounds per square inch absolute, or about one-third normal atmospheric pressure. Preliminary reports indicate that neither the aquanauts nor the "space-travelers" suffered any ill effects from their prolonged stay in the helium-oxygen atmospheres.

A 4-inch helium pipeline, 2.5 miles in length, was completed late in the year to supply grade A helium to the Rocketdyne facility at Santa Susana, Calif. The pipeline will transfer helium, shipped in railway tank cars from Bureau of Mines plants, from rail siding to the Rocketdyne facilities, where it will be used in the development and testing of rocket engines, particularly for the *Saturn* program. Prior to completion of the pipeline, helium had to be transferred to the Rocketdyne installation by highway semitrailers. The pipeline was constructed and will be operated by the Chatsworth Pipeline Company.

A report on a Long-Range Helium Transportation Optimization Study was completed by Bureau of Mines personnel for the National Aeronautics and Space Administration, Kennedy Space Center, Merritt Island Launch Area, Fla.

Work completed at the Bureau of Mines Helium Research Center for which results were published included preparation of primary standard gas mixtures for analytical instruments,[3] technique for ultrapurification of helium,[4] thermodynamic properties of nitrogen gas,[5] and a procedure for analyzing impurities in grade A helium in the parts-per-billion range.[6]

The Bureau of Mines Helium Research Center, located at Amarillo, Tex., is working to learn more about the basic properties of helium, to develop better and less costly methods of extracting helium from natural gases, and to improve and maintain the purity of helium available for commercial use.

[3] Miller, J. E., A. J. Carroll, and D. E. Emerson. Preparation of Primary Standard Gas Mixtures for Analytical Instruments. BuMines Rept. of Inv. 6674, 1965, 10 pp.

[4] Purer, Alfred, Lowell Stroud, and Thomas O. Meyer. Simple Technique for the Ultrapurification of Helium. Advances in Cryogenic Engineering, Plenum Press, New York, v. 10, 1965, pp. 398–401.

[5] Barieau, R. E. Analytical Expressions for the Zero-Pressure Thermodynamic Properties of Nitrogen Gas, Including Corrections for the Latest Values of the Atomic Constants and the New C-12 Atomic Weight Scale. J. of Phys. Chem., v. 69, No. 1, February 1965, pp. 495–499.

[6] Purer, Alfred. A Procedure for Analysis of Impurities in Grade-A Helium in the Parts-Per-Billion Range. J. of Gas Chromatography, v. 3, No. 4, May 1965, pp. 165–169.

Appendix

Tables of Measurement

Volumetric measures

	U.S. gallons	Imperial gallons	Cubic feet	Barrels	Cubic centimeters	Liters	Cubic meter
1 U.S. gallon [1]	1	0.83268	0.133681	0.0238095	3,675.41	3.78533	0.0037854
1 imperial gallon [2]	1.20094	1	.160544	.028594	4,546.04	4.54596	.004546
1 cubic foot	7.4805	6.2288	1	.17811	28,317.01	28.316	.028317
1 barrel	42	34.9726	5.6146	1	158,987.55	158.984	.15899
1 cubic centimeter	.000026417	.00021996	.000035314	.0000062895	1	.00099997	.000001
1 liter	.264178	.219975	.035316	.00629	1,000.027	1	.001000027
1 cubic meter	264.17	219.97	35.315	6.2898	1,000,000	999.973	1

[1] U.S. gallon = the volume occupied by 231 cubic inches.
[2] 1 imperial gallon = the volume occupied by 10 pounds of water at 62° F when weighed against brass in air at 30 inches of barometric pressure.

Weight measures

	Pounds	Kilograms	Short or net tons	Metric tons	Long ton
1 pound	1	0.453592	0.0005	0.00045359	0.00044643
1 short or net hundredweight	100.0	45.359	.05	.04536	.04464
1 gross or long hundredweight	112.0	50.802	.056	.05080	.05
1 kilogram	2.20462	1	.0011023	.0011	.0009842
1 short or net ton	2,000.	907.185	1	.907185	.892857
1 metric ton	2,204.6	1,000	1.10231	1	.98421
1 long ton	2,240	1,016.05	1.12	1.01605	1

NOTE: 1 English water ton = the volume occupied by 1 long ton of water at 60° F.

U.S. GOVERNMENT PRINTING OFFICE : 1967 O—235-818